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IN REPLY REFER TO: Joint Interoperability Test Command (JTE) 25 JUL 14

MEMORANDUM FOR DISTRIBUTION

SUBJECT: Joint Interoperability Certification of the Cisco Systems, Catalyst 3850 Series, software release IOS XE 3.3.0SE

References: (a) Department of Defense Instruction 8100.04, "DoD Unified Capabilities (UC)," 9 December 2010
(b) DoD CIO, Memorandum, "Interim Guidance for Interoperability of Information Technology (IT) and National Security Systems (NSS)," 27 March 2012
(c) through (e), see Enclosure 1

1. **Certification Authority.** References (a) and (b) establish the Joint Interoperability Test Command (JITC) as the Joint Interoperability Certification Authority for the Unified Capabilities (UC) products.

2. **Conditions of Certification.** The Cisco Systems, Catalyst 3850 Series, software release IOS XE 3.3.0SE, hereinafter referred to as the System Under Test (SUT), meets all of the critical requirements of the Unified Capabilities Requirements (UCR), Reference (c), and is certified for joint use as an Assured Services Local Area Network (ASLAN) Layer 2/3 Access switch. The SUT was tested in a stacked configuration with four switches. Each component of the SUT supports 24 or 48 users and may be configured in a stack of up to nine devices to support 432 users. This certification expires upon changes that affect interoperability, but no later than three years from the date of the UC Approved Products List (APL) memorandum.

Table 1. Conditions

Condition	Operational Impact	Remarks
UCR Waivers		
None		
Condition of Fielding (CoF)		
The SUT does not support RFC 4552, Authentication/Confidentiality for OSPFv3.	None with CoF	On 20 May 2014, DISA adjudicated this as minor, accepted the vendor's POA&M, and added the following CoF: The SUT must be configured with ACLs to secure OSPF when deploying IPv6 OSPFv3 until RFC 4552 is supported.
The SUT does not support OSPF with IPSec.	None with CoF	On 20 May 2014, DISA adjudicated this as minor, accepted the vendor's POA&M, and added the following CoF: The SUT must be configured with ACLs to secure OSPF when deploying IPv6 OSPFv3 until RFC 4552 is supported.
Open Test Discrepancies		
Per LoC, the SUT does not comply with RFC 3315, DHCPv6.	Minor	On 20 May 2014, DISA adjudication this as minor and accepted the vendor's POA&M.
Per LoC, the SUT does not support RFC 5798, Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6.	Minor	On 20 May 2014, DISA adjudication this as minor and accepted the vendor's POA&M.
The SUT does not comply with the minimum blocking factor requirements for Core and Distribution products.	Core and Distribution configuration: Critical, Not Certified Access L2/L3: Certified	On 20 May 2014, DISA adjudicated the following: • The SUT is certified as an Access L2/L3 only. • The SUT is not certified for use as Core and Distribution switches

Table 1. Conditions (continued)

LEGEND:

ACLs	Access Control Lists
AH	Authentication Header
B/P/C/S	Base/Post/Camp/Station
CoF	Condition of Fielding
DHCP	Dynamic Host Configuration Protocol
DISA	Defense Information Systems Agency
GbE	Gigabits Ethernet
Gbps	Gigabits per Second
HMAC	Hashed Message Authentication Code
IA	Information Assurance
IAW	In Accordance With
IO	Interoperability
IP	Internet Protocol
IPSec	Internet Protocol Security
LACP	Link Aggregation Control Protocol
LAN	Local Area Network
LoC	Letter of Compliance
OSPF	Open Shortest Path First
POA&M	Plan of Action and Milestones
RFC	Request for Comment
SHA	Secure Hash Algorithm
SSH	Secure Shell
SUT	System Under Test
UCR	Unified Capabilities Requirements
v2	version 2
v3	version 3
v6	version 6
VRRP	Virtual Router Redundancy Protocol

3. **Interoperability Status.** Table 2 provides the SUT interface interoperability status. Table 3 provides the Capability Requirements (CR) and Functional Requirements (FR) status. Table 4 provides a UC APL product summary.

Table 2. ASLAN Interface Status

Interface	Applicability			Status	Threshold CRs/FRs ID (See Note 1)
	C	D	A		
Network Management Interfaces (See Note 2)					
IEEE 802.3i (10BaseT UTP)	c	c	c	Certified	1 and 3.
IEEE 802.3u (100BaseT UTP)	c	c	c	Certified	1 and 3.
IEEE 802.3ab (1000BaseT UTP)	c	c	c	Certified	1 and 3.
Uplink (Trunk) Interfaces (See Note 2)					
IEEE 802.3u (100BaseT UTP)	R	R	R	Certified	1, 2, and 3.
IEEE 802.3u (100BaseFX)	c	c	R	Not Certified (See Note 3)	1, 2, and 3.
IEEE 802.3ab (1000BaseT UTP)	c	c	R	Certified	1, 2, and 3.
IEEE 802.3z (1000BaseX Fiber)	R	R	R	Certified	1, 2, and 3.
IEEE 802.3ae (10GBaseX)	O	O	O	Certified (See Note 4)	1, 2, and 3.
IEEE 802.3ba (40/100GBaseX)	O	O	O	Not Certified (See Note 3)	1, 2, and 3.
Access Interfaces (See Note 2)					
IEEE 802.3i (10BaseT UTP)	c	c	R	Certified	1, 2, and 3.
IEEE 802.3u (100BaseT UTP)	R	R	R	Certified	1, 2, and 3.
IEEE 802.3u (100BaseFX)	c	c	R	Not Certified (See Note 3)	1, 2, and 3.
IEEE 802.3ab (1000BaseT UTP)	c	c	R	Certified	1, 2, and 3.
IEEE 802.3z (1000BaseX Fiber)	R	R	R	Certified	1, 2, and 3.

NOTE(S):

1. Table 3 reflects the SUT's specific capability and functional requirements. Detailed CR/FR information are referenced in Enclosure 3, Table 3-5.
2. If the SUT is an access IP device, the SUT shall provide at least one of the interfaces listed. The USAISEC TIC tested all these interfaces with the exception of the 10BaseT interface. JITC analysis determined that the 10BaseT interface is a low risk for certification based on the vendor's LoC to the IEEE 802.3i and the testing data collected at all other data rates.
3. Interfaces were not submitted for evaluation. The UCR 2013 defines minimum interface requirement, however, allows for additional interfaces.
4. The UCR2013 defines minimum interface requirements, however, allows for additional interfaces.

LEGEND:

ASLAN	Assured Services Local Area Network
802.3ab	1000BaseT Gbps Ethernet over twisted pair at 1 Gbps
802.3ae	10 Gbps Ethernet
802.3ba	40/100 Gbps Ethernet
802.3i	10BaseT 10 Mbps Ethernet over twisted pair
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps
802.3z	Gigabit Ethernet Standard
10BaseT	10 Mbps (Baseband Operation, Twisted Pair) Ethernet
100BaseT	100 Mbps (Baseband Operation, Twisted Pair) Ethernet
100BaseFX	100 Mbps Ethernet over Fiber
1000BaseX	1000 Mbps Ethernet over Fiber or Copper
1000BaseT	1000 Mbps (Baseband Operation, Twisted Pair) Ethernet
10000BaseX	10000 Mbps Ethernet over Fiber or Copper
10GBaseX	10000 Mbps Ethernet over Fiber or Copper
40/100GBaseX	40000/100000 Mbps Ethernet over Fiber or Copper
A	Access
C	Conditional
C	Core
CRs	Capability Requirements
D	Distribution
FRs	Functional Requirements
Gbps	Gigabits per second
ID	Identification
IEEE	Institute of Electrical and Electronics Engineers
JITC	Joint Interoperability Test Command
LoC	Letter of Compliance
Mbps	Megabits per second
O	Optional
R	Required
SUT	System Under Test
TIC	Technology Integration Center
UCR	Unified Capabilities Requirements
USAISEC	U.S. Army Information Systems Engineering Command
UTP	Unshielded Twisted Pair

Table 3. ASLAN Capability Requirements and Functional Requirements Status

CR/FR ID	UCR Requirement (High-Level) (See Note 1)	UCR 2013 Reference	Status
1	General LAN Switch and Router Product Requirements	7.2.1	Partially Met (See Note 2)
2	LAN Switch and Router Redundancy Requirements	7.2.2	Met
3	LAN Product Requirements Summary	7.2.3	Partially Met (See Note 2)
4	Multiprotocol Label Switching in ASLANs	7.2.4	Not Tested (See Note 3)

NOTE(S):
1. The annotation of "required" refers to a high-level requirement category. Enclosure 3 reflects the applicability of each sub-requirement.
2. Refer to Table 1, Conditions.
3. MPLS is an optional requirement, was not tested, and therefore is not certified for use.

LEGEND:

ASLAN	Assured Services Local Area Network	LAN	Local Area Network
CR	Capability Requirement	MPLS	Multiprotocol Label Switching
FR	Functional Requirement	UCR	Unified Capabilities Requirements
ID	Identification		

Table 4. UC APL Product Summary

Product Identification			
Product Name	Cisco Catalyst 3850 Series		
Software Release	IOS XE 3.3.0SE		
UC Product Type(s)	ASLAN Core/Distribution/Access IP Switch		
Product Description	The Catalyst 3850 Series is Cisco's next-generation of stackable access layer switches that provide secure transport of Voice, Video, and Data traffic. It delivers scalable performance and port density across a multi-chassis configuration using L2/3 switching protocols, while providing shared access ports to the end user. The Catalyst 3850 supports 10/100/1000 access ports and both 1 Gigabit and 10 Gigabit Ethernet uplinks using optional network modules. Furthermore, it utilizes the StackWise-480 architecture to allow multiple switches to be stacked together up to nine switches that could support up to 432 users. In addition, the Catalyst 3850 Series support Cisco StackPower technology that allows the power supplies in a stack to be shared as a common resource among all the switches. Cisco StackPower unifies the individual power supplies installed in the switches and creates a pool of power, directing that power where it is needed. Up to four switches can be configured in a StackPower stack with the special connector at the back of the switch using the StackPower cable.		
Product Components (See Note 1, 2, 3)	**Component Name**	**Version**	**Remarks**
ASLAN Core/Distribution/Access Switch	**WS-C3850-48F**	IOS XE 3.3.0SE	Redundant power modules
	WS-C3850-48U		
	WS-C3850-48P		
	WS-C3850-48T		
	WS-C3850-24U		
	WS-C3850-24P		
	WS-C3850-24T		

NOTE(S):
1. Enclosure 3, Table 3-3 reflects a detailed component and subcomponent list.
2. Components bolded and underlined were tested by USAISEC TIC. The other components in the series family were not tested but are also certified for joint use. The additional components utilize the same software and similar hardware. JITC analysis determined the component to be functionally identical for interoperability certification purposes.
3. Refer to Table 1, Conditions, for conditions and limitations on these approved products.

LEGEND:

APL	Approved Products List	JITC	Joint Interoperability Test Command
ASLAN	Assured Services Local Area Network	TIC	Technology Integration Center
IOS	Internetworking Operating System	UC	Unified Capabilities
IP	Internet Protocol	USAISEC	U.S. Army Information Systems Engineering Command

4. **Test Details.** This certification is based on interoperability testing, DISA adjudication of open test discrepancy reports (TDRs), and review of the vendor's Letters of Compliance (LoC). Testing was conducted at the U.S. Army Information Systems Engineering Command-Technology Integration Center (USAISEC-TIC) at Fort Huachuca, Arizona, from 10 February 2014 through 7 March 2014 using test procedures derived from Reference (d). DISA adjudication of outstanding TDRs was completed on 20 May 2014. Review of the vendor's LoC was completed on 29 May 2014. Information Assurance (IA) testing was conducted by USAISEC TIC-led IA test teams and the results published in a separate report, Reference (e). Enclosure 2 documents the test results and describes the tested network and system configurations. Enclosure 3 provides a detailed list of the interface, capability, and functional requirements.

5. **Additional Information.** JITC distributes interoperability information via the JITC Electronic Report Distribution (ERD) system, which uses Sensitive but Unclassified IP Data

(formerly known as NIPRNet) e-mail. Interoperability status information is available via the JITC System Tracking Program (STP). STP is accessible by .mil/.gov users at https://stp.fhu.disa.mil/. Test reports, lessons learned, and related testing documents and references are on the JITC Joint Interoperability Tool (JIT) at https://jit.fhu.disa.mil/. Due to the sensitivity of the information, the Information Assurance Accreditation Package (IAAP) that contains the approved configuration and deployment guide must be requested directly from the Unified Capabilities Certification Office (UCCO), e-mail: disa.meade.ns.list.unified-capabilities-certification-office@mail.mil. All associated information is available on the DISA UCCO website located at http://www.disa.mil/Services/Network-Services/UCCO.

6. **Point of Contact (POC).** The testing point of contact is Mr. James Hatch, commercial telephone (520) 533-2860, DSN telephone 821-2860; e-mail address james.d.hatch12.civ@mail.mil. The JITC point of contact is Ms. Anita Brown, commercial telephone (520) 538-5164, DSN telephone 879-5164, FAX DSN 879-4347; e-mail address anita.l.brown53.civ@mail.mil; mailing address Joint Interoperability Test Command, ATTN: JTE (Ms. Anita Brown) P.O. Box 12798, Fort Huachuca, AZ 85670-2798. The UCCO tracking number for the SUT is 1323101.

FOR THE COMMANDER:

J. T. Schutte

3 Enclosures a/s

for RIC HARRISON
Chief
Networks/Communications and UC Portfolio

Distribution (electronic mail):
DoD CIO
Joint Staff J-6, JCS
USD(AT&L)
ISG Secretariat, DISA, JTA
U.S. Strategic Command, J665
US Navy, OPNAV N2/N6FP12
US Army, DA-OSA, CIO/G-6 ASA(ALT), SAIS-IOQ
US Air Force, A3CNN/A6CNN
US Marine Corps, MARCORSYSCOM, SIAT, A&CE Division
US Coast Guard, CG-64
DISA/TEMC
DIA, Office of the Acquisition Executive
NSG Interoperability Assessment Team
DOT&E, Netcentric Systems and Naval Warfare
Medical Health Systems, JMIS IV&V
HQUSAISEC, AMSEL-IE-IS
UCCO

ADDITIONAL REFERENCES

(c) Office of the Department of Defense Chief Information Officer, “Department of Defense Unified Capabilities Requirements 2013,” January 2013
(d) Joint Interoperability Test Command, “Unified Capabilities Test Plan (UCTP),” Draft
(e) Joint Interoperability Test Command, “Information Assurance (IA) Assessment of Cisco Catalyst 3850 Series (Tracking Number 1323101),” 21 May 2014

CERTIFICATION SUMMARY

1. SYSTEM AND REQUIREMENTS IDENTIFICATION. The Cisco Catalyst 3850 Series, Software Release IOS XE 3.3.0SE is hereinafter referred to as the System Under Test (SUT). Table 2-1 depicts the SUT identifying information and requirements source.

Table 2-1. System and Requirements Identification

System Identification	
Sponsor	United States Army
Sponsor Point of Contact	PM I3C2, POC: Mr. Jordan Silk, USAISEC TIC, Building 53302, Fort Huachuca, Arizona 85613; e-mail: jordan.r.silk.civ@mail.mil.
Vendor Point of Contact	Cisco Systems Global Certification Team (GCT), 7025-2 Kit Creek Rd., Research Triangle Park, North Carolina 27709, e-mail: certteam@cisco.com, website: www.cisco.com/go/govcerts.
System Name	Cisco Catalyst 3850 Series
Increment and/or Version	IOS XE 3.3.0SE
Product Category	ASLAN
System Background	
Previous certifications	None
Tracking	
UCCO ID	1323101
System Tracking Program ID	System # 4934, Test Activity # 11702
Requirements Source	
Unified Capabilities Requirements	Unified Capabilities Requirements 2013 Section 7.2 and Section 4.2
Remarks	None
Test Organization(s)	USAISEC TIC

NOTE(S): None

LEGEND:

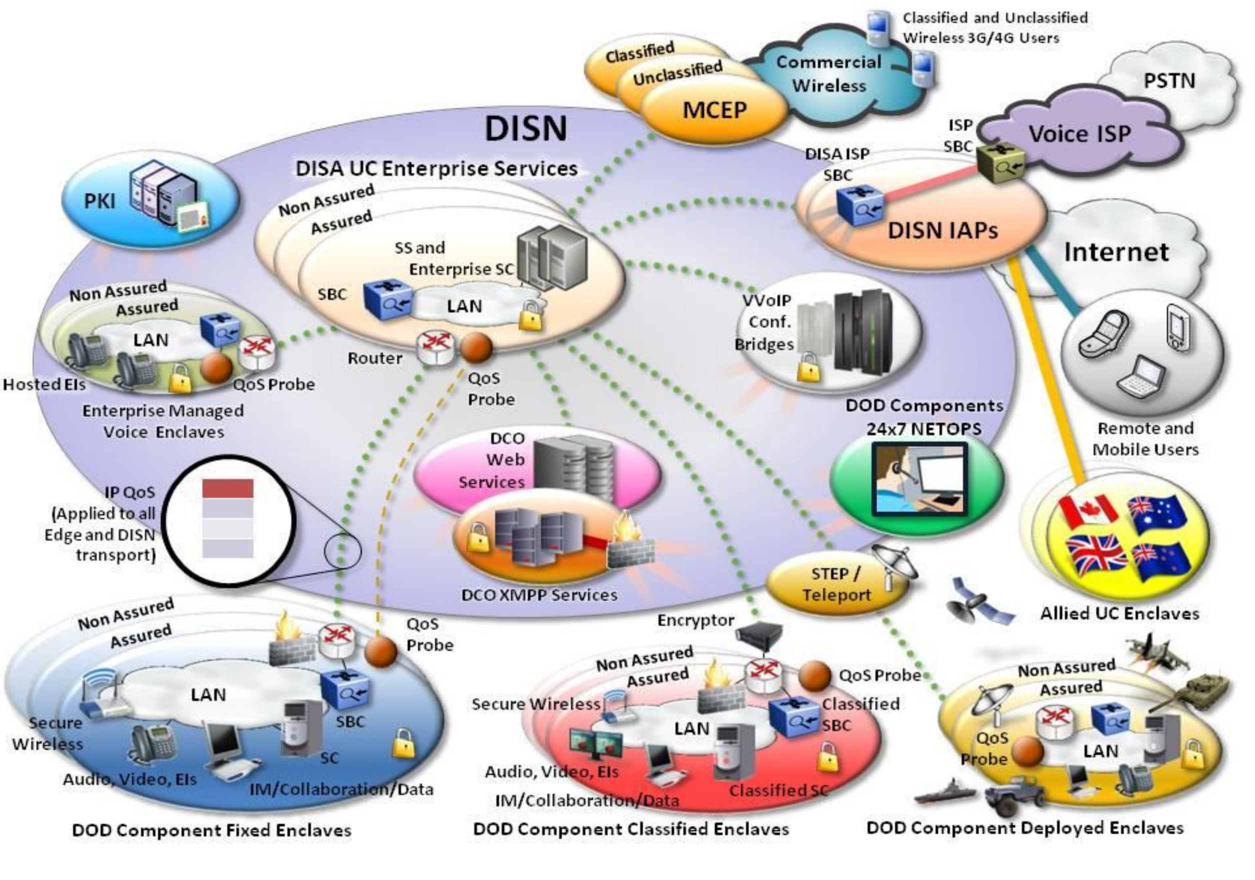
ASLAN	Assured Services Local Area Network
I3C2	Installation Information Infrastructure – Communications and Capabilities
ID	Identification
IOS	Internetworking Operating System
PM	Program Manager
POC	Point of Contact
TIC	Technology Integration Center
UC	Unified Capabilities
UCCO	Unified Capabilities Connection Office
USAISEC	U.S. Army Information Systems Engineering Command

2. SYSTEM DESCRIPTION. Unified Capabilities (UC) Assured Service Local Area Network (ASLAN) components within UC are core, distribution, and access. In addition to testing, an analysis of the vendor’s Letter of Compliance (LoC) verified letter (“R”) requirements were met. The Catalyst 3850 Series is Cisco’s next-generation of stackable access layer switches that provide secure transport of voice, video, and data traffic. It delivers scalable performance and port density across a multi-chassis configuration using Layer 2/3 switching protocols, while providing shared access ports to the end user. The Catalyst 3850 supports 10/100/1000 access ports and both 1 Gigabit and 10 Gigabit Ethernet uplinks using optional network modules. Furthermore, it utilizes the StackWise-480 architecture to allow upt to nine switches to be stacked together to support 432 users. In addition, the Catalyst 3850 deries support Cisco StackPower technology that allows the power supplies in a stack to be shared as a common resource among all the switches. Cisco StackPower unifies the individual power supplies installed in the switches and creates a pool of power, directing that power where it is needed. Up to four switches can be configured in a StackPower stack using a StackPower cable. The Catalyst 3850 fits well with Voice-over-IP, video, and data traffic. See Enclosure 3, Table 3-3 for a list of individual components and descriptions.

3. OPERATIONAL ARCHITECTURE. The UC architecture is a two-level network hierarchy consisting of Department of Defense Information Network (DoDIN) backbone switches and Service/Agency installation switches. The Department of Defense (DoD) Chief Information Officer (CIO) and Joint Staff policy and subscriber mission requirements determine which type of switch can be used at a particular location. The UC architecture, therefore, consists of several categories of switches. Figure 2-1 depicts the notional operational UC architecture.

4. TEST CONFIGURATION. The SUT was tested at USAISEC TIC, Fort Huachuca, Arizona in a manner and configuration similar to that of a notional operational environment. The system's required functions and features were tested using the test configurations depicted in Figure 2-2. Information Assurance testing was conducted using the same configuration.

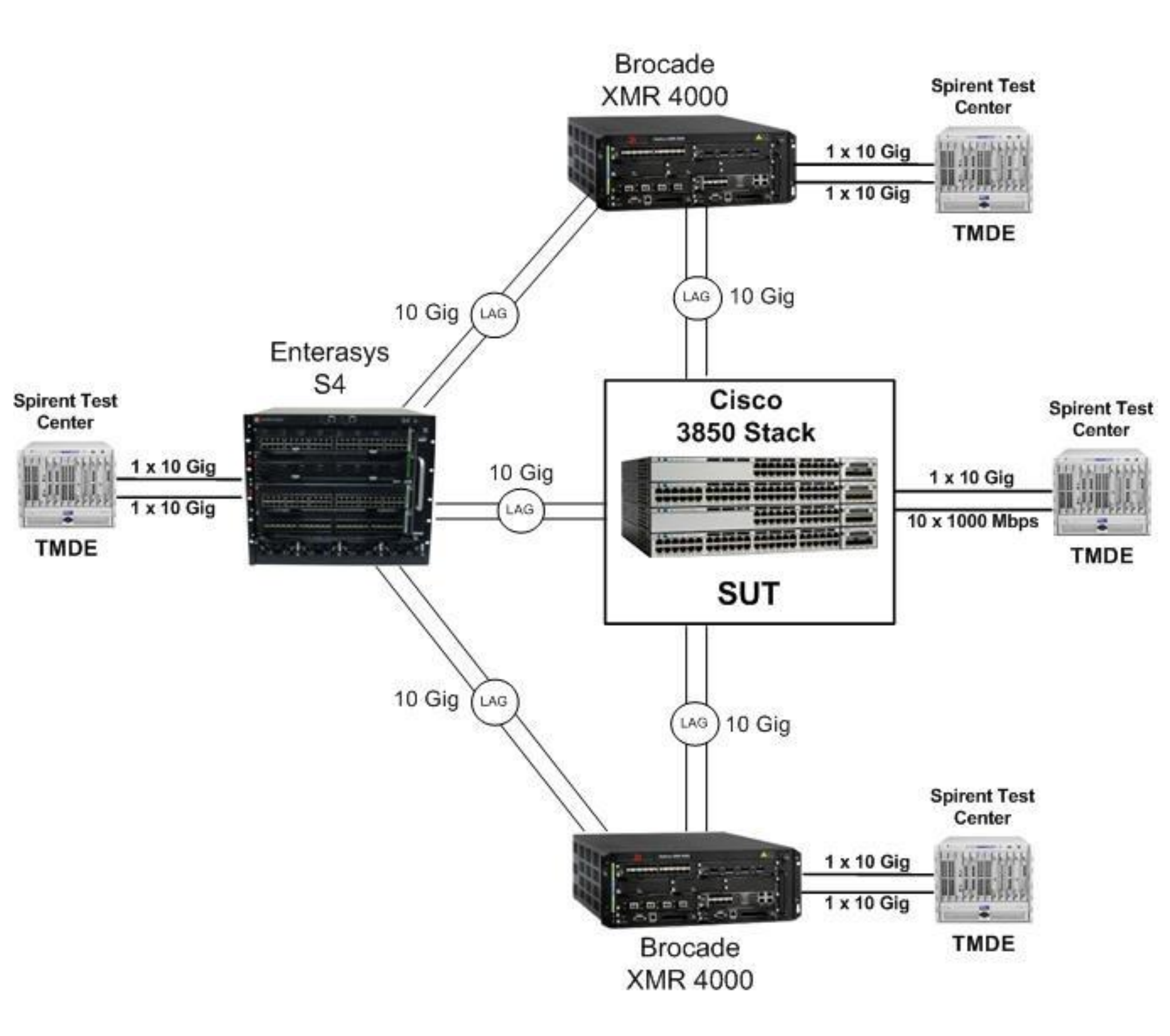
5. METHODOLOGY. Testing of the ASLAN components was conducted in the heterogeneous testing phase only. Figure 2-2 depicts a test network configuration used for heterogeneous testing. These tests are performed by placing the ASLAN SUT components into an ASLAN that are produced by different manufacturers. SUT testing completed during heterogeneous testing will verify the interoperability of the ASLAN components within Voice and Video over IP network (VVoIP).



LEGEND:

ASLAN	Assured Services Local Area Network
AS-SIP	Assured Services Session Initiation Protocol
DCO	Defense Connection Online
DISA	Defense Information Systems Agency
DISN	Defense Information Systems Network
DISR	Department of Defense Information Technology Standards Registry
EBC	Edge Boundary Controller
EI	End Instrument
IP	Internet Protocol
IPSec	Internet Protocol Security
ISP	Internet Service Provider
LSC	Local Session Controller
MFSS	Multifunction Softswitch
PKI	Public Key Infrastructure
QoS	Quality of Service
SBC	Session Border Controller
SRTP	Secure Real-Time Transport Protocol
SS	Softswitch
SSL	Secure Socket Layer
TLS	Transport Layer Security
UC	Unified Capabilities
VLAN	Virtual Local Area Network
VVoIP	Voice and Video over IP
XMPP	Extensible Messaging and Presence Protocol

Figure 2-1. Notional UC Network Architecture



LEGEND:

Gig	Gigabits Per Second	SUT	System Under Test
LAG	Link Aggregation Group	TMDE	Test, Measurement, And Diagnostic Equipment
Mbps	Megabits Per Second		

Figure 2-2. SUT Heterogeneous Test Configuration

6. INTEROPERABILITY REQUIREMENTS, RESULTS, AND ANALYSIS. The interface, Capability Requirements (CR) and Functional Requirements (FR), Information Assurance (IA), and other requirements for UC ASLAN are established by UCR 2013, sections 4, and 5, and 7.2.

a. General LAN Switch and Router Product Requirements. The Core, Distribution, and Access products shall be capable of meeting the following parameters:

(1) Non-blocking. All Core, Distribution, and Access products shall be non-blocking for their ports based on the following traffic engineering. Non-blocking is defined as the capability to send and receive a mixture of 64 to 1518 byte packets at full duplex rates from ingress ports to egress ports through the component's backplane without losing any packets. In a non-blocking switch, all ports can run at full wire speed without any loss of packets or cells. Blocking factor is defined as the ratio of all traffic to non-blocked traffic (i.e., a blocking factor of 8-to-1 means that 12.5 percent of the traffic must be non-blocking). The Cisco Catalyst 3850 Series was submitted for ASLAN Core, Distribution, and Layer 2/3 Access IP Switch testing. The SUT does not comply with the minimum blocking factor requirement for core and distribution products. On 20 May 2014, DISA adjudicated this as Critical for APL. Therefore, the SUT is certified as an Access L2/3 switch only. This requirement was verified through vendor LoC and testing. See Table 3-3 for a list of individual components and descriptions.

(2) Latency. All Core, Distribution, and Access products shall have the capability to transport prioritized packets (media and signaling) as follows. The latency shall be achievable over any 5-minute period measured from ingress ports to egress ports under congested conditions. A congested condition is defined as 100 percent bandwidth utilization. Prioritized packets are defined as packets having a service class above best effort. The E2E SUT Voice latency was measured at 0.032 ms, which met the E2E requirement of no more than 6 ms. Therefore, the SUT also meets the Voice component latency requirement of 2 ms. This requirement was met through testing. The SUT is certified as an Access L2/3 switch only.

(3) Jitter. All Core, Distribution, and Access products shall have the capability to transport prioritized packets (media and signaling) as follows. The jitter shall be achievable over any 5-minute period measured from ingress ports to egress ports under congested conditions. Congested condition is defined as 100 percent bandwidth utilization. The E2E SUT Voice Jitter was measured at 0.005 ms, which met the E2E requirement of no more than 3 ms. Therefore, the SUT also meets the voice component jitter requirement of 1 ms. This requirement was met through testing. The SUT is certified as an Access L2/3 switch only.

(4) Packet Loss. All Core, Distribution and Access products shall have the capability to transport prioritized packets (media and signaling) as follows. The packet loss shall be achievable over any 5-minute period measured from ingress ports to egress ports under congested conditions. Congested condition is defined as 100 percent bandwidth utilization. The E2E SUT Voice packet loss was measured at 0.00 percent, which met the E2E requirement of no more than 0.045 percent. Therefore, the SUT also meets the Voice component packet loss requirement of 0.015 percent. This requirement was met through testing. The SUT is certified as an Access L2/3 switch only.

b. Port Interface Rates Requirements

(1) Minimally, Core and Distribution products shall support the following interface rates (other rates and Institute of Electronics and Electrical Engineers (IEEE) standards may be provided as optional interfaces). Rates specified are the theoretical maximum data bit rate specified for Ethernet; link capacity and effective throughput is influenced by many factors. For calculation purposes, link capacities are to be calculated IAW definitions contained in Request for Comments (RFC) 2330 and RFC 5136. Network Management (NM) interfaces are defined in Section 2.19. These requirements were met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only. The product must minimally support the following interfaces for interconnection between the core to WAN, distribution-core, and distribution-access:

- 100 megabits per second (Mbps) in accordance with (IAW) IEEE 802.3u.
- 1000 Mbps IAW IEEE 802.3z.

(2) Minimally, Access products shall provide one of the following user-side interface rates (other rates and IEEE standards may be provided as optional interfaces). These requirements were met through vendor LoC and testing:

- 10 Mbps IAW IEEE 802.3i.
- 10 Mbps IAW IEEE 802.3j.
- 100 Mbps IAW IEEE 802.3u.
- 1000 Mbps IAW IEEE 802.3z.
- 1000 Mbps IAW IEEE 802.3ab.

(3) Minimally, Access products shall provide one of the following trunk-side interface rates (other rates and IEEE standards may be provided as optional interfaces). These requirements were met through vendor LoC and testing:

- 100 Mbps IAW IEEE 802.3u.
- 1000 Mbps IAW IEEE 802.3z.

(4) The Core, Distribution, and Access products may provide a fibre channel interface IAW American National Standards Institute (ANSI) International Committee for Information Technology Standards (INCITS) T11.2 and T11.3 (previously known as X3T9.3). Fibre channel was not submitted for certification. If provided, the interface must meet the following:

- RFC 4338, Transmission of IPv6, IPv4, and Address Resolution Protocol (ARP) Packets over Fibre Channel.
- RFC 4044, Fibre Channel Management.

(5) The Core, Distribution, and Access products may provide one or more of the following wireless LAN interface rates. Wireless interfaces were not submitted for certification:

- 54 Mbps IAW IEEE 802.11a.

- 11 Mbps IAW IEEE 802.11b.
- 54 Mbps IAW IEEE 802.11g.
- 300–600 Mbps IAW IEEE 802.11n.
- IEEE 802.16-2012: Broadband wireless communications standards for MANs.
- Other approved IEEE wireless interfaces may be implemented as optional interfaces.

(5) If any of the above wireless interfaces are provided, then the interfaces must support the requirements of Section 7.3, Wireless LAN.

c. Port Parameter Requirements. The Core, Distribution, and Access products shall provide the following parameters on a per port basis as specified:

- (1) Auto-negotiation IAW IEEE 802.3. This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(2) Force mode IAW IEEE 802.3. This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(3) Flow control IAW IEEE 802.3x (Optional: Core). This requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

(4) Filtering IAW appropriate RFC 1812 sections (sections applying to filtering). This requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

(5) Link Aggregation IAW IEEE 802.1AX (applies to output/egress trunk-side ports only) (Optional Access). This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(6) Spanning Tree Protocol IAW IEEE 802.1D (Optional: Core). This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(7) Multiple Spanning Tree IAW IEEE 802.1s (Optional: Core). This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(8) Rapid Reconfiguration of Spanning Tree IAW IEEE 802.1w (Optional: Core). This requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

(9) Port-Based Access Control IAW IEEE 802.1x (Optional: Core, Distribution, and Access). This requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

(10) Link Layer Discovery Protocol (LLDP) IAW IEEE 802.1AB (Optional Core, Distribution, and Access). This requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

(11) Link Layer Discovery – Media Endpoint Discovery IAW ANSI/ Telecommunications Industry Association (TIA)-1057 (Optional Core, Distribution, and Access). This requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

(12) Power over Ethernet (PoE) IAW either 802.3af-2003 or 802.3at-2009. (Required only for VVoIP solutions; for data applications or non-Assured Services (AS) solutions, PoE is optionally required.) PoE requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

d. Class of Service Markings Requirements

(1) The Core, Distribution, and Access products shall support Differentiated Services Code Points (DSCPs) IAW RFC 2474 for both Internet Protocol (IP) IPv4 and IPv6 Packets, as follows:

(a) The Core and Distribution products shall be capable of accepting any packet tagged with a DSCP value (0-63) on an ingress port and assign that packet to a Quality of Service (QoS) behavior listed in Section 7.2.1.6, Quality of Service Features. The SUT is not certified as a core or distribution switch.

(b) The Core and Distribution products shall be capable of accepting any packet tagged with a DSCP value (0-63) on an ingress port and reassign that packet to any new DSCP value (0-63). Current DSCP values are provided in Section 6.2.2, Differentiated Service Code Point. (Optional: Access products). The SUT is not certified as a core or distribution switch.

(c) The Core and Distribution products must be able to support the prioritization of aggregate service classes with queuing according to Section 7.2.1.6, Quality of Service Features. The SUT is not certified as a core or distribution switch.

(d) Access products (including Passive Optical Network) shall be capable of supporting the prioritization of aggregate service classes with queuing according to Section 7.2.1.6, Quality of Service Features. This requirement was met through vendor LoC and testing.

(2) The Core, Distribution, and Access products may support the 3-bit user priority field of the IEEE 802.1Q 2-byte Tag Control Information (TCI) field (see Figure 7.2-1, IEEE 802.1Q Tagged Frame for Ethernet, and Figure 7.2-2, TCI Field Description). Default values are provided in Table 7.2-1, 802.1Q Default Values. If provided, the following Class of Service (CoS) requirements apply:

(a) The Core, Distribution, and Access products shall be capable of accepting any frame tagged with a user priority value (0–7) on an ingress port and assign that frame to a QoS behavior listed in Section 7.2.1.6, Quality of Service Features. This requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

(b) The Core and Distribution products shall be capable of accepting any frame tagged with a user priority value (0-7) on an ingress port and reassign that frame to any new user priority value (0-7) (Optional: Distribution and Access). This requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

e. Virtual LAN Capabilities Requirements

(1) The Core, Distribution, and Access products shall be capable of the following:

(a) Accepting Virtual Local Area Network (VLAN) tagged frames according to IEEE 802.1Q (see Figure 7.2-1, IEEE 802.1Q Tagged Frame for Ethernet, and Figure 7.2-2, TCI Field Description). This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(b) Configuring VLAN IDs (VIDs). VIDs on an ingress port shall be configurable to any of the 4094 values (except 0 and 4095). This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(c) Supporting VLANs types IAW IEEE 802.1Q. This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(2) The Unified Capabilities (UC) products must be capable of accepting VLAN tagged frames and assigning them to the VLAN identified in the 802.1Q VID field (see Figure 7.2-4, IEEE 802.1Q-Based VLANs). This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

f. Protocols Requirements. The Core, Distribution, and Access products shall meet protocol requirements for IPv4 and IPv6. RFC requirements are listed in Table 7.2-2, ASLAN Infrastructure RFC Requirements. Additional IPv6 requirements by product profile are listed in Section 5, IPv6. These RFCs are not meant to conflict with Department of Defense (DoD) Information Assurance (IA) policy 9[e.g., Security Technical Implementation Guidelines (STIGs)). Whenever a conflict occurs, DoD IA policy takes precedence. If there are conflicts with Section 5, RFCs applicable to IPv6 in Section 5 take precedence. All protocols are supported with the exceptions of the following as indicated through the vendor LoC and testing:

(1) Cisco Catalyst 3850 Series does not support RFC 5798, Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6. On 20 May 2014, DISA adjudicated this as minor and accepted the vendor’s POA&M .

(2) Cisco Catalyst 3850 does not comply with OSPFv3 RFC 4552 . On 20 May 2014, DISA adjudicated this as minor, accepted the vendor’s POA&M, and added the following CoF: The SUT must be configured with ACLs to secure OSPF when deploying IPv6 OSPFv3 until RFC 4552 is supported.

(3) Cisco Catalyst 3850 does not comply with RFC 3315, DHCPv6. On 20 May 2014, DISA adjudication this as minor and accepted the vendor's POA&M.

(4) Cisco Catalyst 3850 does not comply with OSPF with IPSec. On 20 May 2014, DISA adjudicated this as minor, accepted the vendor's POA&M, and added the following CoF: The SUT must be configured with ACLs to secure OSPF when deploying IPv6 OSPFv3 until RFC 4552 is supported.

g. Quality of Service Features Requirements

(1) The Core, Distribution, and Access products shall be capable of the following QoS Features:

(a) Providing a minimum of four queues. This requirement was met through vendor LoC and testing, that proved the SUT supports four queues. The SUT is certified as an Access L2/3 switch only.

(b) Assigning any incoming access/user-side "tagged" session to any of the queues for prioritization onto the egress (trunk-side/network-side) interface. This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(c) Supporting Differentiated Services (DS), Per-Hop Behaviors (PHBs), and traffic conditioning IAW RFCs 2474, 2597, and 3246. This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(d) All queues shall be capable of having a bandwidth (BW) assigned (i.e., queue 1: 200 Kbps, queue 2: 500 kbps) or percentage of traffic (queue 1: 25 percent, queue 2: 25 percent). The BW or traffic percentage shall be fully configurable per queue from 0 to full BW or 0 to 100 percent. The sum of configured queues shall not exceed full BW or 100 percent of traffic. This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(e) Core, Distribution, and Access products shall meet the traffic conditioning (policing) requirements of Section 6.2.4. This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(2) The product shall support the Differentiated Services Code Point (DSCP) plan, as shown in Table 7.2-3, DSCP Assignments. DSCP assignments shall be software configurable for the full range of 6-bit values (0-63 Base10) for backwards compatibility with IP precedence environments that may be configured to use the Type of Service (TOS) field in the IP header but do not support DSCP. This requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

h. Network Monitoring Requirements. The Core, Distribution, and Access products shall support the following network monitoring features:

(1) Simple Network Management Protocol Version 3 (SNMPv3) IAW RFCs 3411, 3412, 3413, 3414, 3415, 3416, and 3417. The SilverCreek SNMP Test Suite was used to capture SNMP traps. This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

(2) Remote Monitoring (RMON) IAW RFC 2819. This requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

(3) Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework IAW RFC 3584. This requirement was met through vendor LoC. The SUT is certified as an Access L2/3 switch only.

(4) The Advanced encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model IAW RFC 3826. Security was tested by USAISEC TIC-led IA test teams, and the results were published in a separate report, Reference (e).

i. Security Requirements. The Core, Distribution, and Access products shall meet the security protocol requirements listed in Section 4, Information Assurance (IA), as follows: Core and Distribution products shall meet all requirements annotated as Router (R) and LAN Switch (LS). Access switches shall meet the IA requirements annotated for LS. In addition to wireless IA requirements previously specified, Wireless Local Area Network Access Systems (WLASs) and Wireless Access Bridges (WABs) shall meet all IA requirements for LSs. Wireless End Instruments (WEIs) shall meet all IA requirements annotated for End Instruments (EIs). When conflicts exist between the Unified Capabilities Requirements (UCR) and Security Technical Implementation Guides (STIGs) requirements, the STIGs requirements will take precedence. Security was tested by the USAISEC TIC-led IA test team and results are published in a separate report, Reference (e). All Security Requirements are supported with the exceptions of the following as indicated through the vendor LoC:

Cisco Catalyst 3850 does not comply with SSHv2 IAW 4.2.8 IA-067000. This is an informational-only. The SUT permits HMAC-SHA1-96, but allows SSH clients to negotiate usage of other HMACs. This discrepancy was adjudicated and accepted by DISA on 20 May 2014 as an informational-only.

j. LAN Switch and Router Redundancy Requirements. The ASLAN (High and Medium) shall have no single point of failure that can cause an outage of more than 96 IP telephony subscribers. A single point of failure up to and including 96 subscribers is acceptable; however, to support mission-critical needs, FLASH/FLASH OVERRIDE (F/FO) subscribers should be engineered for maximum availability. To meet the availability requirements, all switching/routing platforms that offer service to more than 96 telephony subscribers shall provide redundancy in either of two ways:

- The product itself (Core, Distribution, or Access) provides redundancy internally.
- A secondary product is added to the ASLAN to provide redundancy to the primary product (redundant connectivity required).

(1) Single Product Redundancy Requirements. If a single product is used to meet the redundancy requirements, then the following requirements are applicable to the product:

- Dual Power Supplies
- Dual Processors (Control Supervisors)
- Termination Sparing
- Redundancy Protocol
- No Single Failure Point
- Switch Fabric or Backplane Redundancy

(2) Dual Product Redundancy Requirements. If the System Under Test (SUT) provides redundancy through dual products, then the following requirements are applicable:

The failover over to the secondary product must not result in any lost calls. The secondary product may be in "standby mode" or "active mode," regardless of the mode of operation the traffic engineering of the links between primary and secondary must meet the requirements provided in Section 7.5.19, Traffic Engineering. NOTE: In the event of a primary product failure, all calls that are active shall not be disrupted (loss of existing connection requiring redialing) and the failover to the secondary product must be restored within 5 seconds. This requirement was met through vendor LoC and testing. The SUT is certified as an Access L2/3 switch only.

c. LAN Product Requirements Summary. Table 7.2-4 summarizes the LAN product requirements. These requirements were verified via a combination of Letter of Compliance (LoC) and testing and are addressed in other sections of this document. The SUT is certified as an Access L2/3 switch only.

d. Multiprotocol Label Switching Requirements in ASLANs. The implementation of ASLANs sometimes may cover a large geographical area. For large ASLANs, a data transport technique referred to as Multiprotocol Label Switching (MPLS) may be used to improve the performance of the ASLAN core layer. MPLS was not submitted for certification.

e. Hardware/Software/Firmware Version Identification: Enclosure 3, Table 3-3 lists the SUT components' hardware, software version, and firmware version tested. The USAISEC TIC tested the SUT in an operationally realistic environment to determine its interoperability capability with associated network devices and network traffic. Enclosure 3, Table 3-4 lists the hardware, software version, and firmware version of the components used in the test infrastructure.

7. TESTING LIMITATIONS. None.

8. CONCLUSION(S). The SUT meets the critical interoperability requirements for an Access L2/3 switch only in accordance with the UCR and is certified for joint use with other UC Products listed on the Approved Products List (APL). The SUT meets the interoperability requirements for the interfaces listed in Enclosure 3, Table 3-1.

DATA TABLES

Table 3-1. Interface Status

Interface	Applicability			Status	Threshold CRs/FRs ID (See Note 1)
	C	D	A		
Network Management Interfaces (See Note 2)					
IEEE 802.3i (10BaseT UTP)	c	c	c	Certified	1 and 3.
IEEE 802.3u (100BaseT UTP)	c	c	c	Certified	1 and 3.
IEEE 802.3ab (1000BaseT UTP)	c	c	c	Certified	1 and 3.
Uplink (Trunk) Interfaces (See Note 2)					
IEEE 802.3u (100BaseT UTP)	R	R	R	Certified	1, 2, and 3.
IEEE 802.3u (100BaseFX)	c	c	R	Not Certified (See Note 3)	1, 2, and 3.
IEEE 802.3ab (1000BaseT UTP)	c	c	R	Certified	1, 2, and 3.
IEEE 802.3z (1000BaseX Fiber)	R	R	R	Certified	1, 2, and 3.
IEEE 802.3ae (10GBaseX)	O	O	O	Certified (See Note 4)	1, 2, and 3.
IEEE 802.3ba (40/100GBaseX)	O	O	O	Not Certified (See Note 3)	1, 2, and 3.
Access Interfaces (See Note 2)					
IEEE 802.3i (10BaseT UTP)	c	c	R	Certified	1, 2, and 3.
IEEE 802.3u (100BaseT UTP)	R	R	R	Certified	1, 2, and 3.
IEEE 802.3u (100BaseFX)	c	c	R	Not Certified (See Note 3)	1, 2, and 3.
IEEE 802.3ab (1000BaseT UTP)	c	c	R	Certified	1, 2, and 3.
IEEE 802.3z (1000BaseX Fiber)	R	R	R	Certified	1, 2, and 3.

NOTE(S):

1. Table 3 reflects the SUT's specific capability and functional requirements. Detailed CR/FR information are referenced in Enclosure 3, Table 3-5.
2. If the SUT is an access IP device, the SUT shall provide at least one of the interfaces listed. The USAISEC TIC tested all these interfaces with the exception of the 10BaseT interface. JITC analysis determined that the 10BaseT interface is a low risk for certification based on the vendor's LoC to the IEEE 802.3i and the testing data collected at all other data rates.
3. Interfaces were not submitted for evaluation. The UCR 2013 defines minimum interface requirement, however, allows for additional interfaces.
4. The UCR2013 defines minimum interface requirements, however, allows for additional interfaces.

LEGEND:

802.3ab	1000BaseT Gbps Ethernet over twisted pair at 1 Gbps	C	Core
802.3ae	10 Gbps Ethernet	CRs	Capability Requirements
802.3ba	40/100 Gbps Ethernet	D	Distribution
802.3i	10BaseT 10 Mbps Ethernet over twisted pair	FRs	Functional Requirements
802.3u	Standard for carrier sense multiple access with collision detection at 100 Mbps	Gbps	Gigabits per second
		ID	Identification
802.3z	Gigabit Ethernet Standard	IEEE	Institute of Electrical and Electronics Engineers
10BaseT	10 Mbps (Baseband Operation, Twisted Pair) Ethernet	JITC	Joint Interoperability Test Command
100BaseT	100 Mbps (Baseband Operation, Twisted Pair) Ethernet	LoC	Letter of Compliance
100BaseFX	100 Mbps Ethernet over Fiber	Mbps	Megabits per second
1000BaseX	1000 Mbps Ethernet over Fiber or Copper	O	Optional
1000BaseT	1000 Mbps (Baseband Operation, Twisted Pair) Ethernet	R	Required
10000BaseX	10000 Mbps Ethernet over Fiber or Copper	SUT	System Under Test
10GBaseX	10000 Mbps Ethernet over Fiber or Copper	TIC	Technology Integration Center
40/100GBaseX	40000/100000 Mbps Ethernet over Fiber or Copper	UCR	Unified Capabilities Requirements
A	Access	USAISEC	U.S. Army Information Systems Engineering Command
C	Conditional	UTP	Unshielded Twisted Pair

Table 3-2. Capability and Functional Requirements and Status

CR/FR ID	Capability/Function	Applicability (See note 1)	UCR Reference	Status
1	**General LAN Switch and Router Product (See note 2)**			
	Port Interface Rates	Required	7.2.1.1	Met
	Port Parameter	Required	7.2.1.2	Met
	Class of Service Markings	Required	7.2.1.3	Met
	Virtual LAN Capabilities	Required	7.2.1.4	Met
	Protocols	Required	7.2.1.5	Partially Met (See note 3)
	Quality of Service Features	Required	7.2.1.6	Met
	Network Monitoring	Required	7.2.1.7	Met
	Security	Required	7.2.1.8	Partially Met (See note 4)
2	**LAN Switch and Router Redundancy**			
	Single Product Redundancy	Optional	7.2.2.1	Met
	Dual Product Redundancy	Optional	7.2.2.2	Met
3	**LAN Product Requirements Summary**			
	LAN Product Requirements Summary	Optional	7.2.3	Partially Met (See note 3, 4)
4	**MPLS in ASLANs**			
	MPLS ASLAN	Optional	7.2.4.2	Not Tested (See note 5)
	MPLS VPN Augmentation to VLANs	Optional	7.2.4.3	Not Tested (See note 5)

Table 3-2. Capability and Functional Requirements and Status (continued)

NOTE(S):

1. Reference UCR 2013 signed March 1, 2013.

2. The SUT was submitted and tested as an ASLAN Core, Distribution, and Layer 2/3 Access IP Switch. However, the SUT does not comply with minimum blocking factor requirements for core and distribution switches. On 20 May 2014, DISA adjudicated the following:

- The SUT is certified as an Access L2/L3 only.
- The SUT is not certified for use as Core and Distribution switches.

3. The SUT does not support the following protocols:

a. RFC 5798, Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6. On 20 May 2014, DISA adjudication this as minor and accepted the vendor’s POA&M.

b. RFC 4552, OSPFv3, Authentication/Confidentiality.   On 20 May 2014, DISA adjudicated this as minor, accepted the vendor’s POA&M, and added the following CoF: The SUT must be configured with ACLs to secure OSPF when deploying IPv6 OSPFv3 until RFC 4552 is supported.

c. RFC 3315, DHCPv6. On 20 May 2014, DISA adjudication this as minor and accepted the vendor’s POA&M.

d. OSPF with IPSec. On 20 May 2014, DISA adjudicated this as minor, accepted the vendor’s POA&M, and added the following CoF: The SUT must be configured with ACLs to secure OSPF when deploying IPv6 OSPFv3 until RFC 4552 is supported.

4. Security was tested by the USAISEC TIC-led IA test team and results are published in a separate report, Reference (e).

5. MPLS is an optional requirement, was not tested, and therefore is not certified for use.

LEGEND:

ACLs	Access Control Lists
AH	Authentication Header
ASLAN	Assured Services Local Area Network
B/P/C/S	Base/Post/Camp/Station
CR	Capability Requirement
DHCP	Dynamic Host Configuration Protocol
DISA	Defense Information Systems Agency
FR	Functional Requirement
GbE	Gigabit Ethernet
Gbps	Gigabits per second
HMAC	Hashed Message Authentication Code
IA	Information Assurance
IAW	In Accordance With
ID	Identification
IO	Interoperability
IP	Internet Protocol
IPSec	Internet Protocol Security
LAN	Local Area Network
LACP	Aggregation Control Protocol
LoC	Letter of Compliance
MPLS	Multiprotocol Label Switching
OSPF	Open Shortest Path First
POA&M	Plan of Action and Milestones
RFC	Request for Comment
SHA	Secure Hash Algorithm
SSH	Secure Shell
SUT	System Under Test
TIC	Technology Integration Center
UCR	Unified Capabilities Requirements
USAISEC	U.S. Army Information Systems Engineering Command
v2	version 2
v3	version 3
v6	version 6
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
VRRP	Virtual Router Redundancy Protocol

Table 3-3. SUT Hardware/Software/Firmware Version Identification

Component (See note 1, 2, 3)	Release	Sub-component	Function	Blocking Factor (See note 2 and 3)	
				C/D (See note 4)	A
WS-C3850-48F	IOS XE 3.3.0SE	**C3850-NM-4-10G** **C3850-NM-2-10G** C3850-NM-4-1G	**Cisco Catalyst 3850 Stackable 48-port 10/100/1000 GbE PoE+, with 1100WAC power supply, 1RU, 4-port 1/10 GbE SFP/ SFP+ Network Module** Catalyst 3850 4-port 1 GbE SFP Network Module	**Not Certified**	**Medium**
WS-C3850-48U			**Cisco Catalyst 3850 Stackable 48-port 10/100/1000 GbE UPOE, with 1100WAC power supply, 1RU, 2-port 1 GbE SFP and 2-port 10 GbE SFP+ Network Module** Catalyst 3850 4-port 1 GbE SFP Network Module	**Not Certified**	**Medium**
WS-C3850-48P			Cisco Catalyst 3850 Stackable 48-port 10/100/1000 GbE PoE+, with 715WAC power supply, 1RU	Not Certified	Medium
WS-C3850-24P			Cisco Catalyst 3850 Stackable 24-port 10/100/1000 GbE PoE+, with 715WAC power supply, 1RU	Not Certified	Medium
WS-C3850-48T			Cisco Catalyst 3850 Stackable 48-port 10/100/1000 GbE, with 350WAC power supply, 1RU	Not Certified	Medium
WS-C3850-24T			Cisco Catalyst 3850 Stackable 24-port 10/100/1000 GbE, with 350WAC power supply, 1RU	Not Certified	Medium
WS-C3850-24U			Cisco Catalyst 3850 Stackable 24-port 10/100/1000 GbE UPOE, with 1100WAC power supply, 1 RU	Not Certified	Medium

NOTE(S):

1. Components bolded and underlined were tested by USAISEC TIC. The other components in the family series were not tested; however, they utilize the same software and similar hardware. JITC analysis determined them to be functionally identical for interoperability certification purposes and are also certified for joint use.
2. Blocking factor is the ratio of all traffic to non-blocked traffic; i.e., a block factor of 8 to 1 means 12.5 percent of the traffic is not blocked.
3. There are three levels of non-blocking for core, distribution, and access switches. For core and distribution, the minimum performance level is 2 to 1, medium level is 1.5 to 1, and maximum level is 1 to 1 (100 percent non-blocking). For access, the minimum performance level is 8 to 1, medium level is 2 to 1, and maximum level is 1 to 1 (100 percent non-blocking).
4. Refer to Memo, Table 1, Conditions, and Enclosure 3, Table 3-2, Capability and Functional Requirements and Status, for conditions and limitations on these products.

LEGEND:

A	Access	PoE+	Power Over Ethernet Plus
ASLAN	Assured Services Local Area Network	RU	Rack Unit
C	Core	SFP	Small Form-factor Pluggable
D	Distribution	SFP+	Small Form-factor Pluggable Plus
GbE	Gigabit Ethernet	SUT	System Under Test
IO	Interoperability	TIC	Technology Integration Center
IOS	Internetworking Operating System	UPOE	Universal Power Over Ethernet
IP	Internet Protocol	USAISEC	U.S. Army Information Systems Engineering Command
JITC	Joint Interoperability Test Command	WAC	Wattage Alternate Current

Table 3-4. Test Infrastructure Hardware/Software/Firmware Version Identification

System Name	Software Release	Function
Required Ancillary Equipment		
Windows Server	2008 Enterprise SP1 UGM Army Server 2008R2	Active Directory
Windows 7 Enterprise SP1 Army Golden Master Windows 7 Pilot 2.0.0	Kiwi v1.4.4	SysLog Server
Test Network Components		
Brocade XMR-4000	v5.4	Heterogeneous Interoperability
Enterasys S4	v7.41	Heterogeneous Interoperability
Spirent TestCenter	v4.38	TMDE

LEGEND:

SP	Service Pack	UGM	Universal Golden Master
SysLog	System Log	v	Version
TMDE	Test, Measurement & Diagnostic Equipment		

Table 3-5. ASLAN Component Capability/Functional Requirements

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
1	**7.2.1 – General LAN Switch and Router Product**			
1-1	**7.2.1 – General LAN Switch and Router Product Requirements**			
1	The Core, Distribution, and Access products shall be capable of meeting the following parameters: a. Non-blocking. All Core, Distribution, and Access products shall be non-blocking for their ports based on the following traffic engineering. Non-blocking is defined as the capability to send and receive a mixture of 64 to 1518 byte packets at full duplex rates from ingress ports to egress ports through the component's backplane without losing any packets. In a non-blocking switch, all ports can run at full wire speed without any loss of packets or cells. Blocking factor is defined as the ratio of all traffic to non-blocked traffic (i.e., a blocking factor of 8 to 1 means that 12.5 percent of the traffic must be nonblocking). Each Core, Distribution, and Access product has up to three levels of performance: Minimum, Medium, and Maximum. For certification purposes, products need only meet minimum performance levels. (1) Access Products. Access products (including PON that is used as an access device) shall not have a blocking factor that exceeds 8 to 1 (minimum). This blocking factor includes all hardware and software components. Medium performance level Access products shall not have a blocking factor that exceeds 2 to 1. This blocking factor includes all hardware and software components. Maximum performance level Access products shall be non-blocking. This blocking factor includes all hardware and software components. (2) Distribution and Core Products. These products shall not have a blocking factor that exceeds 2 to 1 (minimum). This blocking factor includes all hardware and software components. Medium performance level products shall not have a blocking factor that exceeds 1.5 to 1. This blocking factor includes all hardware and software components. Maximum performance level products shall be non-blocking. This blocking factor includes all hardware and software components.	7.2.1 EDG-000010	L/T IO-17	Core (R) Distro (R) Access (R)
2	b. Latency. All Core, Distribution, and Access products shall have the capability to transport prioritized packets (media and signaling) as follows. The latency shall be achievable over any 5-minute period measured from ingress ports to egress ports under congested conditions. Congested condition is defined as 100 percent bandwidth utilization. Prioritized packets are defined as packets having a service class above best effort. (1) Voice Packets. No more than 2 milliseconds (ms) latency. (2) Voice and video signaling packets. No more than 2 milliseconds (ms) latency. (3) Video Packets. No more than 10 ms latency. Video packets are defined as including video, voice associated with video session, and video signaling. Video packets include both video teleconferencing and streaming video. (4) Preferred Data Packets. N/A. Preferred data is defined in the UC Framework as preferred elastic traffic (see UC Framework 2013, Section 6, Network Infrastructure End-to-End Performance). (5) Best Effort Data. N/A.	7.2.1 EDG-000010	T IO-10 IO-11	Core (R) Distro (R) Access (R)

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
1-1	**7.2.1 – General LAN Switch and Router Product Requirements (continued)**			
3	c. Jitter. All Core, Distribution, and Access products shall have the capability to transport prioritized packets (media and signaling) as follows. The jitter shall be achievable over any 5-minute period measured from ingress ports to egress ports under congested conditions. Congested condition is defined as 100 percent bandwidth utilization. (1) Voice Packets. No more than 1 ms jitter. (2) Video Packets. No more than 10 ms jitter. (3) Preferred Data Packets. N/A. (4) Best Effort Data. N/A.	7.2.1 EDG-000010	T IO-10 IO-11	Core (R) Distro (R) Access (R)
4	d. Packet Loss. All Core, Distribution and Access products shall have the capability to transport prioritized packets (media and signaling) as follows. The packet loss shall be achievable over any 5-minute period measured from ingress ports to egress ports under congested conditions. Congested condition is defined as 100 percent bandwidth utilization. (1) Voice Packets. Allowed packet loss is dependent upon the queuing implemented (i.e., amount of properly traffic shaped bandwidth). Packet loss measured within the configured queuing parameters shall be measured to be no more than 0.015 percent for Access, Distribution, and Core products. (2) Video Packets. Allowed packet loss is dependent on the queuing implemented (i.e., amount of properly traffic shaped bandwidth). Packet loss measured within the configured queuing parameters shall be measured to be no more than 0.05 percent for Access, Distribution, and Core products. (3) Preferred Data packets. Allowed packet loss is dependent on the queuing implemented (i.e., amount of properly traffic shaped bandwidth). Packet loss measured within the configured queuing parameters shall be measured to be no more than 0.05 percent for Access, Distribution, and Core products. (4) Best Effort data packets. Best effort data has no packet loss requirements. Amount of loss is determined by traffic engineering and offered load.	7.2.1 EDG-000010	T IO-12	Core (R) Distro (R) Access (R)
1-2	**7.2.1.1 – Port Interface Rates**			
1	Minimally, Core and Distribution products shall support the following interface rates [other rates and Institute of Electronics and Electrical Engineers (IEEE) standards may be provided as optional interfaces]. Rates specified are the theoretical maximum data bit rate specified for Ethernet; link capacity and effective throughput is influenced by many factors. For calculation purposes, link capacities are to be calculated IAW definitions contained in Request for Comments (RFC) 2330 and RFC 5136. Network Management (NM) interfaces are defined in Section 2.19. The product must minimally support the following interfaces for interconnection between the core to WAN, distribution-core, and distribution-access: (5) 100 megabits per second (Mbps) in accordance with (IAW) IEEE 802.3u. (6) 1000 Mbps IAW IEEE 802.3z.	7.2.1.1 EDG-000020	T IO-1	Core (R) Distro (R)

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
1-2	**7.2.1.1 – Port Interface Rates (continued)**			
2	Minimally, Access products shall provide one of the following user-side interface rates (other rates and IEEE standards may be provided as optional interfaces): a. 10 Mbps IAW IEEE 802.3i. b. 10 Mbps IAW IEEE 802.3j. c. 100 Mbps IAW IEEE 802.3u. d. 1000 Mbps IAW IEEE 802.3z. e. 1000 Mbps IAW IEEE 802.3ab.	7.2.1.1 EDG-000030	T IO-1	Access (R)
3	Minimally, Access products shall provide one of the following trunk-side interface rates (other rates and IEEE standards may be provided as optional interfaces): a. 100 Mbps IAW IEEE 802.3u. b. 1000 Mbps IAW IEEE 802.3z.	7.2.1.1 EDG-000040	T IO-1	Access (R)
4	The Core, Distribution, and Access products may provide a fibre channel interface IAW American National Standards Institute (ANSI) International Committee for Information Technology Standards (INCITS) T11.2 and T11.3 (previously known as X3T9.3). If provided, the interface must meet the following: a. RFC 4338, Transmission of IPv6, IPv4, and Address Resolution Protocol (ARP) Packets over Fibre Channel. b. RFC 4044, Fibre Channel Management.	7.2.1.1 EDG-000050	L	Core (O) Distro (O) Access (O)
5	The Core, Distribution, and Access products may provide one or more of the following wireless LAN interface rates: a. 54 Mbps IAW IEEE 802.11a. b. 11 Mbps IAW IEEE 802.11b. c. 54 Mbps IAW IEEE 802.11g. d. 300–600 Mbps IAW IEEE 802.11n. e. IEEE 802.16-2012: Broadband wireless communications standards for MANs. f. Other approved IEEE wireless interfaces may be implemented as optional interfaces.	7.2.1.1 EDG-000060	Refer to WIRELESS TPs	Core (O) Distro (O) Access (O)
6	If any of the above wireless interfaces are provided, then the interfaces must support the requirements of Section 7.3, Wireless LAN.	7.2.1.1 EDG-000070	Refer to WIRELESS TPs	Core (C) Distro (C) Access (C)

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
1-3	**7.2.1.2 – Port Parameter**			
1	The Core, Distribution, and Access products shall provide the following parameters on a per port basis as specified: a. Auto-negotiation IAW IEEE 802.3. b. Force mode IAW IEEE 802.3. c. Flow control IAW IEEE 802.3x (Optional: Core). d. Filtering IAW appropriate RFC 1812 sections (sections applying to filtering). e. Link Aggregation IAW IEEE 802.1AX (applies to output/egress trunk-side ports only) (Optional Access). f. Spanning Tree Protocol IAW IEEE 802.1D (Optional: Core). g. Multiple Spanning Tree IAW IEEE 802.1s (Optional: Core). h. Rapid Reconfiguration of Spanning Tree IAW IEEE 802.1w (Optional: Core. i. Port-Based Access Control IAW IEEE 802.1x (Optional: Core, Distribution, and Access). j. Link Layer Discovery Protocol (LLDP) IAW IEEE 802.1AB (Optional Core, Distribution, and Access). k. Link Layer Discovery – Media Endpoint Discovery IAW ANSI/ Telecommunications Industry Association (TIA)-1057 (Optional Core, Distribution, and Access). l. Power over Ethernet (PoE) IAW either 802.3af-2003 or 802.3at-2009. (Required only for VVoIP solutions; for data applications or non-Assured Services (AS) solutions, PoE is optionally required.)	7.2.1.2 EDG-000080	L/T IO-14 IO-15	Core (R) Distro (R) Access (R)

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
1-4	**7.2.1.3 – Class of Service Marketing**			
1	The Core, Distribution, and Access products shall support Differentiated Services Code Points (DSCPs) IAW RFC 2474 for both Internet Protocol (IP) IPv4 and IPv6 Packets, as follows: a. The Core and Distribution products shall be capable of accepting any packet tagged with a DSCP value (0-63) on an ingress port and assign that packet to a Quality of Service (QoS) behavior listed in Section 7.2.1.6, Quality of Service Features. b. The Core and Distribution products shall be capable of accepting any packet tagged with a DSCP value (0-63) on an ingress port and reassign that packet to any new DSCP value (0-63). Current DSCP values are provided in Section 6.2.2, Differentiated Service Code Point. (Optional: Access products) c. The Core and Distribution products must be able to support the prioritization of aggregate service classes with queuing according to Section 7.2.1.6, Quality of Service Features. d. Access products (including Passive Optical Network) shall be capable of supporting the prioritization of aggregate service classes with queuing according to Section 7.2.1.6, Quality of Service Features. Queuing may be supported in either of the two following class of service (CoS) methods: (1) Layer 3 CoS Layer 3 Cos involves support for DSCP IAW RFC 2474 for IPv4 and IPv6. Within this CoS method, the access product shall support queuing by either: a) queuing directly based on the DSCP within the IP header (IPv4 and IPv6). The original DSCP value must also be preserved and passed unaltered through the product; or, b) The product shall inspect the IP header (IPv4 and IPv6). Based on the DSCP value contained within the IP header, the product may map the DSCP value (0-63) to the Ethernet priority field (decimal values 0-7). Queuing may be based on the mapping of the DSCP to a layer 2 priority field value. Any received DSCP value (0- 63) must be able to be mapped to any priority value (0-7). The original DSCP value must be preserved and passed unaltered through the product. (2) Layer 2 Cos. Layer 2 CoS shall use the Virtual LAN identification (VLAN ID), see Section 7.2.1.4, defined in IEEE 802.1Q to perform queuing assignment. Access devices shall be capable of assigning any VLAN ID (either directly or through the 3 Ethernet priority bits (decimal values 0 through 7) to any of the 4 queues.	7.2.1.3 EDG-000090	T IO-13	Core (R) Distro (R) Access (R)

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

<table>
<tr><th>CR/FR ID</th><th>Requirement</th><th>UCR Ref (UCR 2013) (See note 1)</th><th>LoC/ TP ID (See note 2)</th><th>R/O/C</th></tr>
<tr><td><b>1-4</b></td><td colspan="4"><b>7.2.1.3 – Class of Service Marketing (continued)</b></td></tr>
<tr><td>2</td><td>The Core, Distribution, and Access products may support the 3-bit user priority field of the IEEE 802.1Q 2-byte Tag Control Information (TCI) field (see Figure 7.2-1, IEEE 802.1Q Tagged Frame for Ethernet, and Figure 7.2-2, TCI Field Description). Default values are provided in Table 7.2-1, 802.1Q Default Values. If provided, the following Class of Service (CoS) requirements apply:

a. The Core, Distribution, and Access products shall be capable of accepting any frame tagged with a user priority value (0–7) on an ingress port and assign that frame to a QoS behavior listed in Section 7.2.1.6, Quality of Service Features.

b. The Core and Distribution products shall be capable of accepting any frame tagged with a user priority value (0-7) on an ingress port and reassign that frame to any new user priority value (0-7) (Optional: Distribution and Access).

<b>IEEE 802.1Q Tagged Frame for Ethernet</b>
<table>
<tr><th colspan="9">BYTES</th></tr>
<tr><td>7</td><td>1</td><td>6</td><td>6</td><td>2</td><td>2</td><td>2</td><td>42-1496</td><td>4</td></tr>
<tr><td>Preamble</td><td>SFD</td><td>DA</td><td>SA</td><td>TPID</td><td>TCI</td><td>Type Length</td><td>Data</td><td>CRC</td></tr>
</table>
<b>802.1Q Default Values</b>
<table>
<tr><th rowspan="2">AGGREGATE SERVICE CLASS</th><th rowspan="2">GRANULAR SERVICE CLASS</th><th colspan="2">Default 802.1Q COS TAG</th></tr>
<tr><th>Base 2</th><th>Base 10</th></tr>
<tr><td>Control</td><td>Network control</td><td>111</td><td>7</td></tr>
<tr><td></td><td>User Signaling1</td><td>110</td><td>6</td></tr>
<tr><td></td><td>Circuit Emulation1</td><td>110</td><td>6</td></tr>
<tr><td>Inelastic/ Real-Time</td><td>Short messages1</td><td>110</td><td>6</td></tr>
<tr><td></td><td>Voice2</td><td>101</td><td>5</td></tr>
<tr><td></td><td>Video/VTC</td><td>100</td><td>4</td></tr>
<tr><td></td><td>Streaming</td><td>011</td><td>3</td></tr>
<tr><td>Preferred Elastic</td><td>Interactive Transactions
OA&M – SNMP</td><td>010</td><td>2</td></tr>
<tr><td></td><td>File Transfers
OA&M – Trap/SysLog</td><td>001</td><td>1</td></tr>
<tr><td>Elastic</td><td>Default</td><td>000</td><td>0</td></tr>
</table>
</td><td>7.2.1.3
EDG-000100</td><td>L</td><td>Core (O)
Distro (O)
Access (O)</td></tr>
</table>

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
1-5	**7.2.1.4 – Virtual LAN Capabilities**			
1	The Core, Distribution, and Access products shall be capable of the following: a. Accepting Virtual Local Area Network (VLAN) tagged frames according to IEEE 802.1Q (see Figure 7.2-1, IEEE 802.1Q Tagged Frame for Ethernet, and Figure 7.2-2, TCI Field Description). b. Configuring VLAN IDs (VIDs). VIDs on an ingress port shall be configurable to any of the 4094 values (except 0 and 4095). c. Supporting VLANs types IAW IEEE 802.1Q. The VLANs offer the following features: • Broadcast Control. Just as switches isolate collision domains for attached hosts and forward only appropriate traffic out a particular port, VLANs refine this concept further and provide complete isolation between VLANs. A VLAN is a bridging domain, and all broadcast and multicast traffic is contained within it. • Security. The VLANs provide security in two ways: – High-security users can be grouped into a VLAN, possibly on the same physical segment, and no users outside of that VLAN can communicate with them. – The VLANs are logical groups that behave like physically separate entities; inter-VLAN communication is achieved through a router. When inter-VLAN communication occurs through a router, all the security and filtering functionality that routers traditionally provide can be used because routers are able to look at Layer 3 information. • Port-Based. Port-based VLANs are VLANs that are dependent on the physical port a product is connected to. All traffic that traverses the port is marked with the VLAN configured for that port. Each physical port on the switch can support only one VLAN. With port-based VLANs, no Layer 3 address recognition takes place. All traffic within the VLAN is switched, and traffic between VLANs is routed (by an external router or by a router within the switch). This type of VLAN is also known as a segment-based VLAN (see Figure 7.2-3, Port-Based VLAN). • IEEE 802.1Q. VLANs can be assigned by end products IAW the IEEE 802.1Q VLAN ID tag.	7.2.1.4 EDG-000110	T IO-13	Core (R) Distro (R) Access (R)

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
1-5	**7.2.1.4 – Virtual LAN Capabilities (continued)**			
2	The Unified Capabilities (UC) products must be capable of accepting VLAN tagged frames and assigning them to the VLAN identified in the 802.1Q VID field (see Figure 7.2-4, IEEE 802.1Q-Based VLANs). • User-Defined Value. This type of VLAN is typically the most flexible, allowing VLANs to be defined based on the value of any field in a packet or frame. For example, VLANs could be defined on a protocol basis or could be dependent on a particular address (Layer 2 or Layer 3). The simplest form of this type of VLAN is to group users according to their Media Access Control (MAC) addresses (see Figure 7.2-5, User-Defined VLANs). The LAN shall be designed so that Real-Time Services (RTS) and data reside in separate VLANs. Whether a product is performing converged services or a single service will decide how VLANs are designed. The required VLAN types are port-based and IEEE 802.1Q tagged frames. For VoIP, video, and data end products, any end system that supports convergence (i.e., more than one media) requires that the end-system pre-assign the VLAN using IEEE 802.1Q tags before the frames entering the ASLAN. For end-systems that support just one media (i.e., voice or video or data), the LAN can assign the VLAN based on port-based VLAN assignment. Real-time services and data must be placed in separate VLANs for security purpose. The LAN may be designed with more than one VLAN per media type. Signaling for voice and video can be placed in the same VLAN as the respective media, or placed in an entirely different signaling VLAN.	7.2.1.4 EDG-000120	T IO-13	Core (R) Distro (R) Access (R)
1-6	**7.2.1.5 – Protocols**			
1	The Core, Distribution, and Access products shall meet protocol requirements for IPv4 and IPv6. RFC requirements are listed in Table 7.2-2, ASLAN Infrastructure RFC Requirements. Additional IPv6 requirements by product profile are listed in Section 5, IPv6. These RFCs are not meant to conflict with Department of Defense (DoD) Information Assurance (IA) policy (e.g., Security Technical Implementation Guidelines [STIGs]). Whenever a conflict occurs, DoD IA policy takes precedence. If there are conflicts with Section 5, RFCs applicable to IPv6 in Section 5 take precedence.	7.2.1.5 EDG-000130	L/T (refer to Table 3)	Core (R) Distro (R) Access (R)

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
1-7	**7.2.1.6 – Quality of Service Features**			
1	The Core, Distribution, and Access products shall be capable of the following QoS features: a. Providing a minimum of four queues (see Figure 7.2-6, Four-Queue Design). b. Assigning any incoming access/user-side "tagged" session to any of the queues for prioritization onto the egress (trunk-side/network-side) interface. c. Supporting Differentiated Services (DS), Per-Hop Behaviors (PHBs), and traffic conditioning IAW RFCs 2474, 2597, and 3246: (1) Expedited Forwarding (EF). (2) Assured Forwarding (AF). (3) Best Effort (BE). (4) Class Selector (CS). (5) PHB Identification Codes. d. All queues shall be capable of having a bandwidth (BW) assigned (i.e., queue 1: 200 Kbps, queue 2: 500 kbps) or percentage of traffic (queue 1: 25 percent, queue 2: 25 percent). The BW or traffic percentage shall be fully configurable per queue from 0 to full BW or 0 to 100 percent. The sum of configured queues shall not exceed full BW or 100 percent of traffic. e. Core, Distribution, and Access products shall meet the traffic conditioning (policing) requirements of Section 6.2.4 as follows: (1) The product shall calculate the bandwidth associated with traffic conditioning, which requires that the queue size should account for the Layer 3 header (i.e., IP header), but not the Layer 2 headers (i.e., Point-to-Point Protocol [PPP], MAC, and so on) within a margin of error of 10 percent. When the other queues are not saturated, the Best Effort traffic may surge beyond its traffic-engineered limit.	7.2.1.6 EDG-000140	T IO-13	Core (R) Distro (R) Access (R)

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
1-7	**7.2.1.6 – Quality of Service Features (continued)**			
2	Provide a minimum of four queues (see Six-Queue Design). a. Assigning any incoming access/user-side "tagged" session to any of the queues for prioritization onto the egress (trunk-side/network-side) interface. b. Supporting DS, PHBs, and traffic conditioning IAW RFCs 2474, 2597, and 3246: (1) Expedited Forwarding (EF). (2) Assured Forwarding (AF). (3) Best Effort (BE). (4) Class Selector (CS). (5) PHB Identification Codes. c. All queues shall be capable of having a bandwidth (BW) assigned (i.e., queue 1: 200 Kbps, queue 2: 500 kbps) or percentage of traffic (queue 1: 25 percent, queue 2: 25 percent). The BW or traffic percentage shall be fully configurable per queue from 0 to full BW or 0 to 100 percent. The sum of configured queues shall not exceed full BW or 100 percent of traffic. d. Core, Distribution, and Access products shall meet the traffic conditioning (policing) requirements of Section 6.2.4 as follows: (1) The product shall calculate the bandwidth associated with traffic conditioning in accordance with RFC 3246, which requires that the queue size should account for the Layer 3 header (i.e., IP header), but not the Layer 2 headers (i.e., PPP, MAC, etc.) within a margin of error of 10 percent. When the other queues are not saturated, the Best Effort traffic may surge beyond its traffic-engineered limit. (2) Core and Distribution products have been engineered for a blocking factor not to exceed 2:1. The aggregation of the Assured Forwarding and Expedition Forwarding queues should be configured to guarantee prioritization correctly, given the blocking factor. Priority queues (EF, AF4, and AF3) shall be configured as not to exceed 50 percent of the egress link capacity. (3) Access devices have been engineered for a blocking factor of 8:1 or less. Traffic prioritization is accomplished primarily to minimize latency. VoIP traffic is estimated at 2 (for dual appearances) bidirectional calls at 100 Kbps each or 400 Kbps (0 percent of 100 Mbps); video traffic is estimated at 500 Kbps bidirectional or 1 Mbps total (1.0 percent). With estimated blocking factor (8:1), 12.5 percent of the traffic is non-blocking. Based on traffic engineering outlined, the three priority queues should be set up not to exceed 12 percent of the egress link capacity.	7.2.1.6 EDG-000150	T IO-13	Core (R) Distro (R) Access (R)
3	The product shall support the Differentiated Services Code Point (DSCP) plan, as shown in Table 7.2-3, DSCP Assignments. DS assignments shall be software configurable for the full range of six bit values (0-63 Base10) for backwards compatibility with IP precedence environments that may be configured to use the Type of Service (TOS) field in the IP header but do not support DSCP.	7.2.1.6 EDG-000160	T IO-13	Core (R) Distro (R) Access (R)

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
1-8	**7.2.1.7 – Network Monitoring**			
1	The Core, Distribution, and Access products shall support the following network monitoring features: a. Simple Network Management Protocol Version 3 (SNMPv3) IAW RFCs 3411, 3412, 3413, 3414, 3415, 3416, and 3417. b. Remote Monitoring (RMON) IAW RFC 2819. c. Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework IAW RFC 3584. d. The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model IAW RFC 3826.	7.2.1.7 EDG-000170	L/T IO-16	Core (R) Distro (R) Access (R)
1-9	**7.2.1.8 – Security**			
1	The Core, Distribution, and Access products shall meet the security protocol requirements listed in Section 4, Information Assurance, as follows: Core and Distribution products shall meet all requirements annotated as Router (R) and LAN Switch (LS). Access switches shall meet the IA requirements annotated for LS. In addition to wireless IA requirements previously specified, Wireless Local Area Network Access Systems (WLASs) and Wireless Access Bridges (WABs) shall meet all IA requirements for LSs. Wireless End Instruments (WEIs) shall meet all IA requirements annotated for End Instruments (EIs). When conflicts exist between the Unified Capabilities Requirements (UCR) and STIG requirements, the STIG requirements will take precedence. **(Refer to Table 4 for applicable IA requirements)**	7.2.1.8 EDG-000180	L	Core (R) Distro (R) Access (R)
2	**7.2.2 – LAN Switch and Router Redundancy**			
2-1	**7.2.2 – LAN Switch and Router Redundancy Requirements**			
1	The ASLAN (High and Medium) shall have no single point of failure that can cause an outage of more than 96 IP telephony subscribers. A single point of failure up to and including 96 subscribers is acceptable; however, to support mission-critical needs, FLASH/FLASH OVERRIDE (F/FO) subscribers should be engineered for maximum availability. To meet the availability requirements, all switching/routing platforms that offer service to more than 96 telephony subscribers shall provide redundancy in either of two ways: a. The product itself (Core, Distribution, or Access) provides redundancy internally. b. A secondary product is added to the ASLAN to provide redundancy to the primary product (redundant connectivity required).	7.2.2 EDG-000190	T IO-1	Core (R) Distro (R) Access (R)

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
2-2	**7.2.2.1 – Single product Redundancy**			
1	If a single product is used to meet the redundancy requirements, then the following requirements are applicable to the product: a. Dual Power Supplies. The platform shall provide a minimum of two power supplies, each with the power capacity to support the entire chassis. Loss of a single power supply shall not cause any loss of ongoing functions within the chassis. b. Dual Processors (Control Supervisors). The chassis shall support dual-control processors. Failure of any one processor shall not cause loss of any ongoing functions within the chassis (e.g., no loss of active calls). Failure of the primary processor to secondary must meet 5-second failover without loss of active calls. c. Termination Sparing. The chassis shall support a (N + 1) sparing capability for available 10/100 Base-T modules used to terminate to an IP subscriber. d. Redundancy Protocol. Routing equipment shall support a protocol that allows for dynamic rerouting of IP packets so that no single point of failure exists in the ASLAN that could cause an outage to more than 96 IP subscribers. Redundancy protocols will be standards based as specified in this document. e. No Single Failure Point. No single point shall exist in the LAN that would cause loss of voice service to more than 96 IP telephony instruments. f. Switch Fabric or Backplane Redundancy. Switching platforms within the ASLAN shall support a redundant (1 + 1) switching fabric or backplane. The second fabric's backplane shall be in active standby so that failure of the first shall not cause loss of ongoing events within the switch.	7.2.2.1 EDG-000200	1O-2 1O-3 1O-4 1O-5 1O-7 1O-8 1O-9	Core (O) Distro (O) Access (O)
2-3	**7.2.2.2 – Dual product Redundancy**			
1	If the System Under Test (SUT) provides redundancy through dual products, then the following requirements are applicable: a. The failover over to the secondary product must not result in any lost calls. The secondary product may be in "standby mode" or "active mode," regardless of the mode of operation the traffic engineering of the links between primary and secondary must meet the requirements provided in Section 7.5.19, Traffic Engineering.	7.2.2.2 EDG-000210	1O-2 1O-3 1O-4 1O-5 1O-7 1O-8 1O-9	Core (O) Distro (O) Access (O)
3	**7.2.4 – Multiprotocol Label Switching in ASLANs**			
3-1	**7.2.4.2 – MPLS ASLAN**			
1	An ASLAN product that implements MPLS must still meet all the ASLAN requirements for jitter, latency, and packet loss. The addition of the MPLS protocol must not add to the overall measured performance characteristics with the following caveats: a. The MPLS device shall reroute data traffic to a secondary pre-signaled Label Switched Path (LSP) in less than 5 seconds upon indication of the primary LSP failure.	7.2.4.2 EDG-000220	T	Core (O) Distro (O) (See separate MPLS test plan)
2	Assured Services LAN Core and Distribution products are not required to support MPLS. Services and Agencies may choose to implement MPLS in the ASLAN to take advantage of the inherent technological advantages of MPLS. The ASLAN Core and Distribution products that will be used to provide MPLS services must support the RFCs contained in Table 7.2-5, ASLAN Product MPLS Requirements. RFCs are listed as being REQUIRED (R), OPTIONAL (O), or CONDITIONAL (C). Optionally required RFCs are based on implementation of a particular feature, such as Virtual Private Networks (VPNs).	7.2.4.2 EDG-000230	T	Core (O) Distro (O) (See separate MPLS test plan)

Table 3-5. ASLAN Component Capability/Functional Requirements (continued)

CR/FR ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
3-2	**7.2.4.3 – MPLS VPN Augmentation to VLANs**			
1	The ASLAN Core or Distribution products will provide Layer 2 MPLS VPNs by minimally supporting the following: a. RFC 4762, "Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling." The product may additionally support the following: b. RFC 4761, "Virtual Private LAN Services (VPLS) Using BGP for Auto-Discovery and Signaling."	7.2.4.3.1 EDG-000240	T (See separate MPLS test plan)	Core (R) Distro (R)
2	The ASLAN products used to support L2VPNs, RFC 4761, or RFC 4762 may support RFC 5501, "Requirements for Multicast Support in Virtual Private LAN Services."	7.2.4.3.1 EDG-000250	L (See separate MPLS test plan)	Core (O) Distro (O)
3	The ASLAN Core or Distribution products will provide Layer 3 MPLS VPNs by supporting RFC 4364, "BGP/MPLS IP Virtual Private Networks (VPNs)."	7.2.4.3.2 EDG-000260	T (See separate MPLS test plan)	Core (R) Distro (R)
4	The ASLAN products used to support L3VPNs by RFC 4364 shall support the following RFCs: a. RFC 4382, "MPLS/BGP Layer 3 Virtual Private Network (VPN) Management Information Base." b. RFC 4577, "OSPF as the Provider/Customer Edge Protocol for BGP/MPLS IP Virtual Private Networks (VPNs)." c. RFC 4659, "BGP-MPLS IP Virtual Private Network (VPN) Extension for IPv6 VPN." d. RFC 4684, "Constrained Route Distribution for Border Gateway Protocol/Multiprotocol Label Switching (BGP/MPLS) Internet Protocol (IP) Virtual Private Networks (VPNs)."	7.2.4.3.2 EDG-000270	T (See separate MPLS test plan)	Core (R) Distro (R)
5	The MPLS device must support QoS in order to provide for assured services. The product must support one of the following QoS mechanisms: a. DSCP mapping to 3 bit EXP field (E-LSP). b. Label description of PHB (L-LSP).	7.2.4.3.3 EDG-000280	T (See separate MPLS test plan)	Core (R) Distro (R)

Table 3-6. ASLAN Component IPv6 Requirements

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
UCR 2013 Section 5 IPv6 Requirements				
IP-1	**5.2.1 – Product**			
1	The product shall support dual IPv4 and IPv6 stacks as described in RFC 4213. [Conditional: LS] If the Local Area Network (LAN) Switch (LS) also supports a routing function, then the product shall also support dual IPv4 and IPv6 stacks as described in RFC 4213	5.2.1 IP6-000010	L/T IO-10 IO-11 IO-12	Core (R) Distro (C) Access (C)
2	Dual-stack end points shall be configured to choose IPv4 over IPv6.	5.2.1 IP6-000020	L	Core (C) Distro (R) Access (R)
3	All nodes and interfaces that are "IPv6-capable" must be carefully configured and verified that the IPv6 stack is disabled until it is deliberately enabled as part of a deliberate transition strategy. This includes the stateless autoconfiguration of link-local addresses. Nodes with multiple network interfaces may need to be separately configured per interface	5.2.1 IP6-000030	L	Core (R) Distro (R) Access (R)
4	If the LS supports a routing function, then the product shall support the manual tunnel requirements as described in RFC 4213.	5.2.1 IP6-000040	L	Core (C) Distro (C) Access (C)
5	The system shall provide the same (or equivalent) functionality in IPv6 as in IPv4 consistent with the requirements in the UCR for its Approved Products List (APL) category. NOTE: This requirement applies only to products that are required to perform IPv6 functionality.	5.2.1 IP6-000050	L/T IO-10 IO-11 IO-12	Core (R) Distro (R) Access (R)
6	Support IPv6 IAW RFCs 2460 and 5095 if routing functions are supported.	5.2.1 IP6-000060	L/T IO-10 IO-11 IO-12	Core (R) Distro (C) Access (C)
7	The product shall support the transmission of IPv6 packets over Ethernet networks using the frame format defined in RFC 2464.	5.2.1 IP6-000070	L/T IO-10 IO-11 IO-12	Core (R) Distro (R) Access (R)
IP1-1	**5.2.1.1 – Maximum Transmission Unit**			
1	The product shall support Path Maximum Transmission Unit (MTU) Discovery as described in RFC 1981.	5.2.1.1 IP6-000080	L	Core (R) Distro (R) Access (R)
2	The product shall support a minimum MTU of 1280 bytes as described in RFC 2460 and updated by RFC 5095.	5.2.1.1 IP6-000090	L/T IO-10 IO-11 IO-12	Core (R) Distro (R) Access (R)
IP1-2	**5.2.1.2 – Flow Label**			
1	The product shall not use the Flow Label field as described in RFC 2460.	5.2.1.2 IP6-000110	L	Core (R) Distro (R) Access (R)
2	The product shall be capable of setting the Flow Label field to zero when originating a packet.	5.2.1.2 IP6-000120	L	Core (R) Distro (R) Access (R)
3	The product shall not modify the Flow Label field when forwarding packets.	5.2.1.2 IP6-000130	L	Core (R) Distro (R) Access (R)
4	The product shall be capable of ignoring the Flow Label field when receiving packets.	5.2.1.2 IP6-000140	L	Core (R) Distro(R) Access (R)

Table 3-6. ASLAN Component IPv6 Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IP1-3	**5.2.1.3 – Address**			
1	The product shall support the IPv6 Addressing Architecture as described in RFC 4291.	5.2.1.3 IP6-000150	L/T IO-10 IO-11 IO-12	Core (R) Distro (R) Access (R)
2	The product shall support the IPv6 Scoped Address Architecture as described in RFC 4007.	5.2.1.3 IP6-000160	L/T IO-10 IO-11 IO-12	Core (R) Distro (R) Access (R)
3	If a scoped address (RFC 4007) is used, then the product shall use a scope index value of zero when the default zone is intended.	5.2.1.3 IP6-000170	L	Core (C) Distro (C) Access (C)
IP1-4	**5.2.1.4 – Dynamic Host Configuration Protocol**			
1	If Dynamic Host Configuration Protocol (DHCP) is supported within an IPv6 environment, then it shall be implemented in accordance with the DHCP for IPv6 (DHCPv6) as described in RFC 3315.	5.2.1.3 IP6-000180	L	Core (C) Distro (C) Access (C)
2	If the LS supports DHCP and a routing function, then the product shall support RFC 3315.	5.2.1.4 IP6-000190	L/T IO-10 IO-11 IO-12	Core (C) Distro (C) Access (C)
3	If the product supports DHCPv6 and uses authentication, then it shall discard unauthenticated DHCPv6 messages from UC products and log the event.	5.2.1.4 IP6-000270	L	Core (C) Distro (C) Access (C)
IP1-5	**5.2.1.5 – Neighbor Discovery**			
1	The product shall support Neighbor Discovery for IPv6 as described in RFC 4861.	5.2.1.4 IP6-000280	L	Core (R) Distro (C) Access (C
2	If the LS also supports a routing function, then the product shall support RFC 4861.	5.2.1.4 IP6-000290	L	Distro (C) Access (C)
3	The product shall not set the override flag bit in the Neighbor Advertisement message for solicited advertisements for any cast addresses or solicited proxy advertisements.	5.2.1.5 IP6-000300	L	Core (R) Distro (R) Access (R)
4	When a valid "Neighbor Advertisement" message is received by the product and the product neighbor cache does not contain the target's entry, the advertisement shall be silently discarded.	5.2.1.5 IP6-000310	L	Core (R) Distro (R) Access (R)
5	When a valid "Neighbor Advertisement" message is received by the product and the product neighbor cache entry is in the INCOMPLETE state when the advertisement is received and the link layer has addresses and no target link-layer option is included, the product shall silently discard the received advertisement.	5.2.1.5 IP6-000320	L	Core (R) Distro (R) Access (R)
6	When address resolution fails on a neighboring address, the entry shall be deleted from the product's neighbor cache.	5.2.1.5.1 IP6-000330	L	Core (R) Distro (R) Access (R)
7	If the product supports routing functions, then the product shall inspect valid router advertisements sent by other routers and verify that the routers are advertising consistent information on a link and shall log any inconsistent router advertisements.	5.2.1.5.2 IP6-000390	L	Core (R) Distro (C) Access (C)
8	If the product supports routing functions, then the product shall be capable of supporting the MTU value in the router advertisement message for all links in accordance with RFC 4861.	5.2.1.5.2 IP6-000410	L	Core (R) Distro (C) Access (C)

Table 3-6. ASLAN Component IPv6 Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IP1-6	**5.2.1.6 Stateless Address Autoconfiguration and Manual Address Assignment**			
1	If the product supports stateless IP address autoconfiguration including those provided for the commercial market, then the product shall support IPv6 Stateless Address Autoconfiguration (SLAAC) for interfaces supporting UC functions in accordance with RFC 4862.	5.2.1.6 IP6-000420	L	Core (C) Distro (C) Access (C)
2	If the product supports IPv6 SLAAC, then the product shall have a configurable parameter that allows the function to be enabled and disabled. Specifically, the product shall have a configurable parameter that allows the "managed address configuration" flag and the "other stateful configuration" flag to always be set and not perform stateless autoconfiguration.	5.2.1.6 IP6-000430	L	Core (C) Distro (C) Access (C)
3	If the product supports IPv6 SLAAC, then the product shall have the configurable parameter set not to perform stateless autoconfiguration.	5.2.1.6 IP6-000440	L	Core (C) Distro (C) Access (C)
4	While nodes are not required to autoconfigure their addresses using SLAAC, all IPv6 Nodes shall support link-local address configuration and Duplicate Address Detection (DAD) as specified in RFC 4862. In accordance with RFC 4862, DAD shall be implemented and shall be on by default. Exceptions to the use of DAD are noted in the following text.	5.2.1.6 IP6-000450	L	Core (R) Distro (R) Access (R)
5	A node MUST allow for autoconfiguration-related variable to be configured by system management for each multicast-capable interface to include DupAddrDetectTransmits where a value of zero indicates that DAD is not performed on tentative addresses as specified in RFC 4862.	5.2.1.6 IP6-000460	L	Core (R) Distro (R) Access (R)
6	The product shall support manual assignment of IPv6 addresses.	5.2.1.6 IP6-000470	T IO-10 IO-11 IO-12	Core (R) Distro (R) Access (R)
7	If the product provides routing functions, then the product shall default to using the "managed address configuration" flag and the "other stateful flag" set to TRUE in their router advertisements when stateful autoconfiguration is implemented.	5.2.1.6 IP6-000490	L	Core (R) Distro (C) Access (C)
IP1-7	**5.2.1.7 – Internet Control Message Protocol**			
1	The product shall support the Internet Control Message Protocol (ICMP) for IPv6 as described in RFC 4443.	5.2.1.7 IP6-000520	T IO-10 IO-11 IO-12	Core (R) Distro (R) Access (R)
2	The product shall have a configurable rate-limiting parameter for rate limiting the ICMP error messages it originates.	5.2.1.7 IP6-000530	L	Core (R) Distro (R) Access (R)
3	The product shall support the capability to enable or disable the ability of the product to generate a Destination Unreachable message in response to a packet that cannot be delivered to its destination for reasons other than congestion.	5.2.1.7 IP6-000540	L	Core (R) Distro (R) Access (R)
4	The product shall support the enabling or disabling of the ability to send an Echo Reply message in response to an Echo Request message sent to an IPv6 multicast or anycast address.	5.2.1.7 IP6-000550	L	Core (R) Distro (R) Access (R)
5	The product shall validate ICMPv6 messages, using the information contained in the payload, before acting on them.	5.2.1.7 IP6-000560	L	Core (R) Distro (R) Access (R)

Table 3-6. ASLAN Component IPv6 Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IP1-8	**5.2.1.8 – Routing Functions**			
1	If the product supports routing functions, then the product shall support the Open Shortest Path First (OSPF) for IPv6 as described in RFC 5340.	5.2.1.8 IP6-000570	L	Core (R) Distro (C) Access (C)
2	If the product supports routing functions, then the product shall support securing OSPF with IPSec as described for other IPSec instances in Section 4, Information Assurance.	5.2.1.8 IP6-000580	L	Core (R) Distro (C) Access (C)
3	If the product supports routing functions, then the product shall support router-to-router integrity using the IP Authentication Header with HMACSHA1- 96 within Encapsulating Security Payload (ESP) and Authentication Header (AH) as described in RFC 2404.	5.2.1.8 IP6-000590	L	Core (R) Distro (C) Access (C)
4	If the product supports interior routing functions of OSPFv3, then the product shall support RFC 4552.	5.2.1.8 IP6-000600	L	Core (R) Distro (C) Access (C)
5	If the product supports the Intermediate System to Intermediate System (IS-IS) routing protocol used in DoD backbone networks, then the product shall support the IS-IS for IPv6 as described in RFC 5308.	5.2.1.8 IP6-000610	L	Core (C) Distro (C) Access (C)
6	If the product supports IS-IS routing architecture (for IPv6-only or dual-stack operation), then the product shall support RFC 5304 and RFC 5310 and shall support RFC 6119 for IPv6 traffic engineering.	5.2.1.8 IP6-000620	L	Core (C) Distro (C) Access (C)
8	If the product supports routing functions, then the product shall support the Multicast Listener Discovery (MLD) process as described in RFC 2710 and extended in RFC 3810. a. If the product supports MLD process as described in RFC 2710 and extended in RFC 3810, then the product shall support RFC 2711.	5.2.1.8 IP6-000670	L	Core (R) Distro (C) Access (C)
IP1-9	**5.2.1.9 – IP Security**			
1	If the product uses IPSec, then the product shall be compatible with the Security Architecture for the IPSec described in RFC 4301. b. If RFC 4301 is supported, then the product shall support binding of a SA with a particular context. c. If RFC 4301 is supported, then the product shall be capable of disabling the BYPASS IPSec processing choice.	5.2.1.9 IP6-000690	L	Core (R) Distro (C) Access (C)
2	If RFC 4301 is supported, then the product shall not support the mixing of IPv4 and IPv6 in a SA.	5.2.1.9 IP6-000700	L	Core (R) Distro (C) Access (C)
3	If RFC 4301 is supported, then the product's security association database (SAD) cache shall have a method to uniquely identify a SAD entry.	5.2.1.9 IP6-000710	L	Core (R) Distro (C) Access (C)
4	If RFC 4301 is supported, then the product shall implement IPSec to operate with both integrity and confidentiality.	5.2.1.9 IP6-000720	L	Core (R) Distro (C) Access (C)
5	If RFC 4301 is supported, then the product shall be capable of enabling and disabling the ability of the product to send an ICMP message informing the sender that an outbound packet was	5.2.1.9 IP6-000730	L	Core (R) Distro (C) Access (C)
6	If an ICMP outbound packet message is allowed, then the product shall be capable of rate limiting the transmission of ICMP responses.	5.2.1.9 IP6-000740	L	Core (R) Distro (C) Access (C)
7	If RFC 4301 is supported, then the system's Security Policy Database (SPD) shall have a nominal, final entry that discards anything unmatched.	5.2.1.9 IP6-000750	L	Core (R) Distro (C) Access (C)
8	If RFC 4301 is supported, and the product receives a packet that does not match any SPD cache entries, and the product determines it should be discarded, then the product shall log the event and include the date/time, Security Parameter Index (SPI) if available, IPSec protocol if available, source and destination of the packet, and any other selector values of the packet.	5.2.1.9 IP6-000760	L	Core (R) Distro (C) Access (C)

Table 3-6. ASLAN Component IPv6 Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IP1-9	**5.2.1.9 – IP Security (continued)**			
9	If RFC 4301 is supported, then the product should include a management control to allow an administrator to enable or disable the ability of the product to send an IKE notification of an INVALID_SELECTORS.	5.2.1.9 IP6-000770	L	Core (R) Distro (C) Access (C)
10	If RFC 4301 is supported, then the product shall support the ESP Protocol in accordance with RFC 4303.	5.2.1.9 IP6-000780	L	Core (R) Distro (C) Access (C)
11	If RFC 4303 is supported, then the product shall be capable of enabling anti-replay.	5.2.1.9 IP6-000790	L	Core (R) Distro (C) Access (C)
12	If RFC 4303 is supported, then the product shall check, as its first check, after a packet has been matched to its SA whether the packet contains a sequence number that does not duplicate the sequence number of any other packet received during the life of the security association.	5.2.1.9 IP6-000800	L	Core (R) Distro (C) Access (C)
13	If RFC 4301 is supported, then the product shall support IKEv1 as defined in RFC 2409.	5.2.1.9 IP6-000810	L	Core (R) Distro (C) Access (C)
14	To prevent a Denial of Services (DoS) attack on the initiator of an IKE_SA, the initiator shall accept multiple responses to its first message, treat each as potentially legitimate, respond to it, and then discard all the invalid half-open connections when it receives a valid cryptographically protected response to any one of its requests. Once a cryptographically valid response is received, all subsequent responses shall be ignored whether or not they are cryptographically valid.	5.2.1.9 IP6-000820	L	Core (C) Distro (C) Access (C)
15	If RFC 4301 is supported, then the product shall support extensions to the Internet IP Security Domain of Interpretation for the Internet Security Association and Key Management Protocol (ISAKMP) as defined in RFC 2407.	5.2.1.9 IP6-000830	L	Core (R) Distro (C) Access (C)
16	If RFC 4301 is supported, then the product shall support the ISAKMP as defined in RFC 2408.	5.2.1.9 IP6-000840	L	Core (R) Distro (C) Access (C)
17	If the product supports the IPSec Authentication Header Mode, then the product shall support the IP Authentication Header (AH) as defined in RFC 4302.	5.2.1.9 IP6-000850	L	Core (R) Distro (C) Access (C)
18	If RFC 4301 is supported, then the product shall support manual keying of IPSec.	5.2.1.9 IP6-000860	L	Core (R) Distro (C) Access (C)
19	If RFC 4301 is supported, then the product shall support the ESP and AH cryptographic algorithm implementation requirements as defined RFC 4835	5.2.1.9 IP6-000870	L	Core (R) Distro (C) Access (C)
20	If RFC 4301 is supported, then the product shall support the IKEv1 security algorithms as defined in RFC 4109.	5.2.1.9 IP6-000880	L	Core (R) Distro (C) Access (C)
IP1-10	**5.2.1.10 – Network Management**			
1	If IPv6-compatible nodes are managed via Simple Network Management Protocol (SNMP) using IPv6, then the product shall comply with the Management Information Base (MIB) for IPv6 textual conventions and general group as defined in RFC 4293.	5.2.1.10 IP6-000890	L	Core (C) Distro (C) Access (C)
2	If the product performs routing functions and if IPv6-capable nodes are managed via SNMP management using IPv6, then the product shall support the SNMPv3 management framework as described in RFC 3411.	5.2.1.10 IP6-000900	L	Core (C) Distro (C) Access (C)
3	If the product performs routing functions and if IPv6-capable nodes are managed via SNMP management using IPv6, then the product shall support SNMPv3 message processing and dispatching as described in RFC 3412.	5.2.1.10 IP6-000910	L	Core (C) Distro (C) Access (C)
4	If the product performs routing functions and if IPv6-capable nodes are managed via SNMP management using IPv6, then the product shall support the SNMPv3 applications as described in RFC 3413.	5.2.1.10 IP6-000920	L	Core (C) Distro (C) Access (C)

Table 3-6. ASLAN Component IPv6 Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IP1-10	**5.2.1.10 – Network Management (continued)**			
5	If IPv6-compatible nodes are managed via SNMP using IPv6, then the product shall support the IP MIBs as defined in RFC 4293.	5.2.1.10 IP6-000930	L	Core (C) Distro (C) Access (C)
6	If IPv6-compatible nodes are managed via SNMP using IPv6, then the product shall support the Transmission Control Protocol (TCP) MIBs as defined in RFC 4022.	5.2.1.10 IP6-000940	L	Core (C) Distro (C) Access (C)
7	If IPv6-compatible nodes are managed via SNMP using IPv6, then the product shall support the User Datagram Protocol (UDP) MIBs as defined in RFC 4113.	5.2.1.10 IP6-000950	L	Core (C) Distro (C) Access (C)
8	If IPv6-compatible nodes are managed via SNMP using IPv6, and the product performs routing functions and tunneling functions, then the product shall support IP tunnel MIBs as described in RFC 4087.	5.2.1.10 IP6-000960	L	Core (C) Distro (C) Access (C)
9	If the product performs routing functions and is managed by SNMP using IPv6, then the product shall support the IP Forwarding MIB as defined in RFC 4292.	5.2.1.10 IP6-000970	L	Core (C) Distro (C) Access (C)
10	If the product supports routing functions, and the IPSec policy database is configured through SNMPv3 using IPv6, then the product shall support RFC 4807.	5.2.1.10 IP6-000980	L	Core (C) Distro (C) Access (C)
11	If the product uses Uniform Resource Identifiers (URIs) in combination with IPv6, then the product shall use the URI syntax described in RFC 3986.	5.2.1.10 IP6-000990	L	Core (C) Distro (C) Access (C)
IP1-11	**5.2.1.11 – Traffic Engineering**			
1	For traffic engineering purposes, the bandwidth required per voice subscriber is calculated to be 110.0 kbps (each direction) for each IPv6 call. This is based on G.711 (20 ms codec) with IP overhead (100 kbps) resulting in a 250-byte bearer packet plus 10 kbps for signaling, Ethernet Interframe Gap, and the Secure Real-Time Transport Control Protocol (SRTCP) overhead. Based on overhead bits included in the bandwidth calculations, vendor implementations may use different calculations and hence arrive at slightly different numbers.	5.2.1.11 IP6-001010	L	Core (R) Distro (R) Access (R)
2	Despite the differences in IPv6 and IPv4 packet sizes, for planning purposes, the number of VoIP subscribers per link size for IPv6 should be assumed to be approximately the same as for IPv4 and is defined in Table 7.6-2, LAN VoIP Subscribers for IPv4 and IPv6, in Section 7, Network Edge Infrastructure.	5.2.1.11 IP6-001020	L	Core (R) Distro (R) Access (R)
3	Despite the differences in IPv6 and IPv4 packet sizes, for planning purposes, the number of video subscribers per link size for IPv6 should be assumed to be approximately the same as for IPv4 and is defined in Section 7, Network Edge Infrastructure.	5.2.1.11 IP6-001030	L	Core (R) Distro (R) Access (R)

Table 3-6. ASLAN Component IPv6 Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IP1-12	**5.2.1.14 – Miscellaneous**			
1	If the product supports Remote Authentication Dial-in User Service (RADIUS) authentication, then the product shall support RADIUS as defined in RFC 3162. [Conditional: LS] If the LS supports a routing function and supports RADIUS authentication, then the product shall support RADIUS as defined in RFC 3162.	5.2.1.14 IP6-001140	L	Core (R) Distro (C) Access (C)
2	The products shall support Differentiated Services as described in RFC 2474 for a voice and video stream in accordance with Section 2, Session Control Products, and Section 6, Network Infrastructure End-to-End Performance, plain text DSCP plan.	5.2.1.14 IP6-001150	L	Core (R) Distro (R) Access (R)
3	If the product supports roaming (as defined within RFC 4282), then the product shall support this function as described by RFC 4282.	5.2.1.14 IP6-001170	L	Core (C) Distro (C) Access (C)
4	If the product supports the Point-to-Point Protocol (PPP), then the product shall support PPP as described in RFC 5072.	5.2.1.14 IP6-001180	L	Core (C) Distro (C) Access (C)
5	To support ASLAN assured services, all LAN switches that provide layer 3 functionality to the access layer shall support Virtual Router Redundancy protocol (VRRP) for IPv6 as detailed in RFC 5798.	5.2.1.14 IP6-001190	L/T IO-3 to IO-9	Core (C) Distro (R)
6	If the product supports ECN, then the product shall support RFC 3168 for the incorporation of ECN to TCP and IP, including ECN's use of two bits in the IP	5.2.1.14 IP6-001200	L	Core (C) Distro (C) Access (C)

NOTE(S):

1. Reference UCR 2013 signed March 1, 2013.
2. Refers to test methodology for requirement verification via LoC "L", test "T", or both "L/T". Also includes test procedure number.

LEGEND:

ASLAN	Assured Services Local Area Network
C2	Command and Control
CPU	Central Processing Unit
DHCP	Dynamic Host Configuration Protocol
DISR	Department of Defense Information Technology Standards Registry
DSCP	Differentiated Services Code Point
FY	Fiscal Year
HMAC	Hash-based Message Authentication Code
HRS	Hours
HTTPS	Hyper Text Transfer Protocol, Secure
HTTP	Hypertext Transfer Protocol
IA	Information Assurance
IAW	In Accordance with
ICMP	Internet Control Message Protocol
ICMPv6	Internet Control Message Protocol for IPv6
IEEE	Institute Of Electrical and Electronics Engineers
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
MB/S	Megabits per Second
L3	OSI Layer 3
LACP	Link Aggregation Control Protocol
LAN	Local Area Network
LOC	Letter of Compliance
LS	LAN Switch
MPLS	Multiprotocol Label Switching
ms	Millisecond
MTU	Maximum Transmission Unit
NM	Network Management
NMS	Network Management Systems
OSI	Open Systems Interconnection
OSPFv3	Open Shortest Path First Version 3
PHB	Per Hop Behavior
PQ	Priority Queuing
RFC	Request for Comments
SLAAC	Stateless Auto Address Configuration
SNMP	Simple Network Management Protocol
SSH2	Secure Shell Version 2
TCI	Tag Control Information
TP	Test Plan
UCR	Unified Capabilities Requirements
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
WFQ	Weighted Fair Queuing

Table 3-7. ASLAN Component IA Requirements

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
UCR 2013 Section 4 Information Assurance Requirements				
IA-1	**4.2.3 – User Roles**			
1	The product shall be capable of having at least three types of user roles: a system security administrator (e.g., auditor), a system administrator, and an application administrator.	4.2.3 IA-001000	L	Core (R) Distro (R) Access (C)
2	The product shall be capable of providing a mechanism for the appropriate administrator (not a user in the User role) to perform the following functions: IA-004010 Monitor the activities of a specific terminal, port, or network address of the system in real time. IA-004020 Define the events that may trigger an alarm, the levels of alarms, the type of notification, and the routing of the alarm. IA-004030 Provide a capability to monitor the system resources and their availabilities.	4.2.3 IA-004000	L	Core (R) Distro (R) Access (C)
IA-2	**4.2.4 – Ancillary Equipment**			
1	Products that use external Authentication, Authorization, and Accounting (AAA) services provided by the Diameter Base Protocol shall do so in accordance with (IAW) Request for Comment (RFC) 3588. IA-009010 that act as Diameter agents shall be capable of being configured as proxy agents. IA-009020 Systems that act as proxy agents shall maintain session state. IA-009030 All Diameter implementations shall ignore answers received that do not match a known Hop-by-Hop Identifier field. IA-009040 [Conditional: SS, SC, MG, SBC, R, LS, EI, AEI, SD] All Diameter implementations shall provide transport of its messages IAW the transport profile described in RFC 3539. IA-009050 Products that use the Extensible Authentication Protocol (EAP) within Diameter shall do so IAW RFC 4072.	4.2.4 IA-009000	L	Core (C) Distro (C) Access (C)
2	Products shall support the capability to use the Remote Authentication Dial In User Service (RADIUS) IAW RFC 2865 to provide AAA services. IA-010010 Products that use the EAP within RADIUS shall do so IAW RFC 3579. IA-010020 If the products support RADIUS based accounting, then the system shall do so IAW RFC 2866.	4.2.4 IA-010000	L	Core (R) Distro (R) Access (C)
3	Products that use external AAA services provided by the Terminal Access Controller Access Control System (TACACS+) shall do so IAW the TACACS+ Protocol Specification 1.78 (or later).	4.2.4 IA-011000	L	Core (C) Distro (C) Access (C)
4	Products that use external AAA services provided by port based network access control mechanisms shall do so IAW Institute of Electrical and Electronics Engineers (IEEE) 802.1X-2010 in combination with Protected Extensible Authentication Protocol (PEAP) and Extensible Authentication Protocol (EAP)- Transport Layer Security (TLS) support, at a minimum, plus any other desired secure EAP types [e.g., EAP-Tunneled TLS (TTLS)]. IA-013010 Products that use external EAP services provided by EAP shall do so IAW RFC 3748 and its RFC extensions.	4.2.4 IA-013000	L	Core (C) Distro (C) Access (C)

Table 3-7. ASLAN Component IA Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IA-2	**4.2.4 – Ancillary Equipment (continued)**			
5	Products that use external syslog services shall support the capability to do so IAW RFC 3164. IA-014010 Products that support syslog over User Datagram Protocol (UDP) IAW RFC 3164 shall use UDP port 514 for the source port of the sender when using UDP for transport. IA-014020 If the product supports syslog, then the product shall support the capability to generate syslog messages that have all the parts of the syslog packet as described in Section 4.1 of RFC 3164. IA-014030 If the originally formed message has a TIMESTAMP in the HEADER part, then it shall support the capability to specify this field's value in the local time of the device within its time zone and support the ability to specify this field's value in Greenwich Mean Time (GMT). IA-014040 If the originally formed message has a HOSTNAME field, then it shall contain the hostname as it knows itself. If it does not have a hostname, then it shall contain its own IP address. IA-014050 If the originally formed message has a TAG value, then it shall be the name of the program or process that generated the message. IA-014060 [Conditional: SS, SC, MG, SBC, RSF, R, LS, FW, IPS, VPN, NAC] If products use Transmission Control Protocol (TCP) for the delivery of syslog events, then the system shall support the capability to do so IAW the Read and Write (RAW) profile defined in RFC 3195.	4.2.4 IA-014000	L	Core (C) Distro (C) Access (C)
6	If the product implements NTP, then the default version shall be Network Time Protocol (NTP) version 3 (NTPv3).	4.2.4 IA-016000	L	Core (C) Distro (C) Access (C)
IA-3	**4.2.6 – VVoIP Authorization**			
1	The product shall have the capability of controlling the flow of traffic across an interface to the network based on the source/destination IP address, source/destination port number, Differentiated Services Code Point (DSCP), and protocol identifier ("6 tuple").	4.2.6 IA-026000	L	Core (R) Distro (R) Access (R)
2	The product shall have the capability of permitting the configuration of filters that will permit or deny IP packets on the basis of the values of the packet's source address, destination address, protocol, source port, and destination port in the packets header. These filters shall have the capability of using any one value, all values, or any combination of values. Filters using source ports and destination ports shall have the capability to be configured to use ranges of values defined by the operators (1) equal to, (2) greater than, (3) less than, (4) greater than or equal to and (5) less than or equal to.	4.2.6 IA-030000	L	Core (R) Distro (R)
3	The product shall be capable of supporting a minimum of five distinct VLANs for VVoIP.	4.2.6 IA-031000	L	Core (R) Distro (R) Access (R)
4	The product shall have the capability to deploy using private address space IAW RFC 1918.	4.2.6 IA-033000	L	Core (R) Distro (R)
5	If DHCP is used, then the product shall be capable of using 802.1X in combination with a secure EAP type (defined within this UCR and the STIGs/SRGs) residing on the authentication server and within the operating system or application software of the EI and AEI to authenticate to the LAN.	4.2.6 IA-037000	L	Core (R) Distro (R)

Table 3-7. ASLAN Component IA Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IA-3	**4.2.7 – Public Key Infrastructure**			
1	The product shall be capable of generating asymmetric keys whose length is at least 2048 for Rivest Shamir Adleman (RSA).	4.2.7 IA-040000	L	Core (R) Distro (R) Access (R)
2	The product shall be capable of generating symmetric keys whose length is at least 128 bits.	4.2.7 IA-041000	L	Core (R) Distro (R) Access (R)
3	The product shall be capable of storing key pairs and their related certificates.	4.2.7 IA-042000	L	Core (R) Distro (R) Access (R)
4	The product shall operate with DoD-approved trust anchors (e.g., public keys and the associated certificates the relying party deems as reliable and trustworthy, typically root certification authorities [CAs]). IA-043010 Any system that performs PKI certificate validation operations must implement the basic steps outlined in Section 6.1.3 of the internet X.509 certificate specification Request for Comment (RFC) 5280. IA-043020 The system must also provide the capability to check certificate revocation status as part of the certificate validation process as defined in RFC 5280.	4.2.7 IA-043000	L	Core (R) Distro (R) Access (R)
5	The product shall be capable of supporting end entity server and device certificates and populating all certificate fields IAW methods described in the “DoD PKI Functional Interface Specification.”	4.2.7 IA-044000	L	Core (R) Distro (R) Access (R)
6	The product shall be capable of using the Lightweight Directory Access Protocol (LDAP) version 3 (LDAPv3), LDAP over TLS (LDAPS), Hypertext Transfer Protocol (HTTP), or HTTP Secure (HTTPS) as appropriate when communicating with DoD-approved PKIs.	4.2.7 IA-045000	L	Core (R) Distro (R) Access (R)
7	If Certificate Revocation Lists (CRLs) are used, then the product shall be capable of using either the date and time specified in the next update field in the CRL or using a configurable parameter to define the period associated with updating the CRLs.	4.2.7 IA-046000	L	Core (C) Distro (C) Access (C)
8	If CRLs are used, then the product shall be capable of obtaining the CRL from the CRL Distribution Point (CDP) extension of the certificate in question. The product shall be able to process HTTP pointers in the CDP field whereas the ability to process HTTPS and LDAP pointers is considered Objective and is not a hard requirement.	4.2.7 IA-047000	L	Core (C) Distro (C) Access (C)
9	If Online Certificate Status Protocol (OCSP) is used, then the product shall support the capability to use both the Delegated Trust Model (DTM), whereby the OCSP responder's signing certificates are signed by DoD approved PKI CAs, and the OCSP Trusted Responder model, where the OCSP responder uses a self-signed certificate to sign OCSP responses, IAW DoD PKI PMO guidance.	4.2.7 IA-048000	L	Core (C) Distro (C) Access (C)
10	If OCSP is used, then the OCSP responder shall be contacted based on the following information: IA-049010 The OCSP responder preconfigured in the application or toolkit; and IA-049020 The OCSP responder location identified in the OCSP field of the Authority Information Access (AIA) extension of the certificate in question. IA-049030 If both of the above are available, then the product shall be configurable to provide preference for one over the other. IA-049040 The product should (not shall) be configurable to provide preferences or a preconfigured OCSP responder based on the Issuer DN.	4.2.7 IA-049000	L	Core (C) Distro (C) Access (C)

Table 3-7. ASLAN Component IA Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IA-3	**4.2.7 – Public Key Infrastructure (continued)**			
11	The product shall support all of the applicable requirements in the latest DoD Public Key Enabled (PKE) Application Requirements specification published by the DoD PKI PMO.	4.2.7 IA-052000	L	Core (R) Distro (R) Access (R)
12	Systems that perform any PKI operations (e.g., certificate path processing, certificate validation, digital signature generation, and encryption) must support RSA keys up to 2048 bits with Secure Hash Algorithm (SHA)-1 and SHA-2 digital signatures as dictated by the National Institute of Standards and Technology (NIST) Special Publications (SP) 800-57, SP 800-78, and SP 800-131A and the DoD Certificate Policy. IA-053010 The product shall support the capability to verify certificates, CRLs, OCSP responses, or any other signed data produced by a DoD approved PKI using RSA in conjunction with the SHA-256 algorithm.	4.2.7 IA-053000	L	Core (R) Distro (R) Access (R)
13	The product shall log when a session is rejected due to a revoked certificate.	4.2.7 IA-054000	L	Core (R) Distro (R) Access (R)
14	The product shall be capable of supporting the development of a certificate path and be able to process the path. IA-055010 The path process shall fail when a problem that prohibits the validation of a path occurs.	4.2.7 IA-055000	L	Core (R) Distro (R) Access (R)
15	The product shall be capable of ensuring that the intended use of the certificate is consistent with the DoD-approved PKI extensions. IA-056010 The product shall be capable of ensuring that the key usage extension in the end entity certificate is set properly. IA-056020 [Required: SS, SC, MG, SBC, RSF, R, AEI, LS, SD; Conditional: EI] The product shall be capable of ensuring that the digital signature bit is set for authentication uses. IA-056030 [Required: SS, SC, MG, SBC, RSF, R, AEI, NAC, LS, SD; Conditional: EI] The product shall be capable of ensuring that the non-repudiation bit is set for nonrepudiation uses.	4.2.7 IA-056000	L	Core (R) Distro (R) Access (R)
16	Periodically, the system shall examine all of the certificates and trust chains associated with ongoing, long-lived, sessions. The system shall terminate any ongoing sessions based on updated revocation/trust information if it is determined that the corresponding certificates have been revoked, are no longer trusted, or are expired. IA-059010 [Conditional: R, LS] If the system supports manual loading of a CRL or CTLs configured by an administrator, then the system shall check all ongoing sessions as soon as updates to the internally stored CRL or trust lists occur. IA-059020 [Conditional: R, LS] If the system supports automated retrieval of a CRL from a CDP, then the system shall immediately check the certificates and trust chains associated with all ongoing sessions against the newly retrieved CRL. IA-059030 [Conditional: R, LS] If the system supports automated retrieval of a CRL from a CDP, then the system shall support the ability to configure the interval in which the CRL is retrieved periodically. IA-059040 [Conditional: R, LS] If the system supports queries against an online status check responder (an OCSP responder in the case of the DoD PKI), then the system shall periodically query the responder to determine if the certificates corresponding to any ongoing sessions have been revoked. IA-059050 [Conditional: R, LS] If the system supports queries against an online status check responder (an OCSP responder in the case of the DoD PKI), by default, for each session, then the device shall query the online status check responder every 24 hours for as long as the session remains active. IA-059060 [Conditional: R, LS] If the system supports queries against an online status check responder (an OCSP responder in the case of the DoD PKI), then the system shall support the ability to configure the interval at which the system periodically queries the online status check responder.	4.2.7 IA-059000	L	Core (R) Distro (R) Access (R)

Table 3-7. ASLAN Component IA Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IA-3	**4.2.7 – Public Key Infrastructure (continued)**			
17	The system shall be capable of sending an alert when installed certificates corresponding to trust chains, OCSP responder certificates, or any other certificates installed on the device that cannot be renewed in an automated manner, are nearing expiration. IA-060010 By default, the system shall be capable of sending this alert 60 days before the expiration of the installed credentials, which cannot be renewed automatically. This alert should be repeated periodically on a weekly or biweekly basis by default.	4.2.7 IA-060000	L	Core (R) Distro (R) Access (R)
IA-4	**4.2.8 – Integrity**			
1	The entire SNMPv3 message shall be checked for integrity and shall use the HMAC-SHA1-96 with 160-bit key length by default.	4.2.8 IA-066000	L	Core (R) Distro (R) Access (R)
2	If the product uses SSHv2, then the product shall use HMAC-SHA1-96 with 160 bit key length for data integrity.	4.2.8 IA-067000	L	Core (C) Distro (C) Access (C)
IA-5	**4.2.9 – Confidentiality**			
1	If IPSec is used, then the product shall be capable of using IKE for IPSec key distribution: IA-071010 The product shall be capable of using IKE version 1. IA-071020 If IPSec is used, then the product shall be capable of using the digital signature authentication mode with X.509 certificates during Phase I of the Internet Security Association and Key Management Protocol (ISAKMP) negotiation for authentication. IA-071030 If IPSec is used, then the product shall be capable of using the Quick Mode as the default Phase II Security Association mechanism for the IPSec service. IA-071040 If IPSec is used, then the product shall be capable of using and interpreting certificate requests for Public-Key Cryptography Standard #7 (PKCS#7) wrapped certificates as a request for the whole path of certificates. IA-071050 If IPSec is used, then the product shall be capable of using Main Mode associated with the Diffie-Hellman approach for key generation for the security association negotiation. IA-071060 If IPSec is used, then the product shall be capable of using Diffe-Hellman Groups 1, 2, and 14, at a minimum. IA-071070 [Conditional: SS, SC, MG, FW, IPS, VPN, NAC] If the product uses IPSec, then the system shall be capable of using AES_128_CBC as the default encryption algorithm. The system shall be capable of supporting 3DES-CBC (class value 5) for backwards compatibility with previous UCR revisions. IA-071080 [Former ID: 5.4.6.2.3 1.c.1.c.vi.A] If IPSec is used, then the product shall only support the following erroneous messages associated with a certificate request: (1) Invalid Key. (2) Invalid ID. (3) Invalid certificate encoding. (4) Invalid certificate. (5) Certificate type unsupported. (6) Invalid CA. (7) Invalid hash. (8) Authentication failed. (9) Invalid signature. (10) Certificate unavailable.	4.2.9 IA-071000	L	Core (C) Distro (C) Access (C)

Table 3-7. ASLAN Component IA Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IA-5	**4.2.9 – Confidentiality (continued)**			
2	If the product uses TLS, then the product shall do so in a secure manner as defined by the following subtended requirements. IA-073010 If the product uses TLS, then the system shall be capable of using TLS_RSA_WITH_AES_128_CBC_SHA as its default cipher suite. IA-073020 If the product uses TLS, then the system shall be capable of using a default of no compression. IA-073030 If the product uses TLS, then the system shall be capable of exchanging TLS messages in a single exchange or multiple exchanges. IA-073040 If TLS session resumption is used, then a timer associated with TLS session resumption shall be configurable and the default shall be 1 hour. IA-073050 If TLS session resumption is used, then the maximum time allowed for a TLS session to resume (session resumption) without repeating the TLS authentication/confidentiality/authorization process (e.g., a full handshake) is 1 hour. IA-073060 If the product supports SSL/TLS renegotiation, then the product shall support the capability to disable this feature or the product shall support RFC 5746.	4.2.9 IA-073000	L	Core (C) Distro (C) Access (C)
3	If the product uses Secure Shell (SSH), then the system shall do so in a secure manner as defined by the following subtended requirements. IA-074010 If the product uses SSH, then the system shall be capable of supporting the RSA 2,048-bit key algorithm and the Diffie-Hellman 2,048 bit key algorithm. IA-074020 If the product uses SSH, then a client shall close the session if it receives a request to initiate an SSH session whose version is less than 2.0. IA-074030 If the product uses SSH, then the SSH sessions shall rekey at a minimum every gigabyte of data received or every 60 minutes, whichever comes sooner. IA-074040 If the product uses SSH, then the SSH sessions shall rekey at a minimum every gigabyte of data transmitted or every 60 minutes, whichever comes sooner. IA-074050 If the product uses SSH, then the SSH sessions shall minimally support the AES 128-CBC algorithm as defined in RFC 4253. IA-074070 If the product uses SSH, then the SSH sessions shall use TCP as the underlying protocol. IA-074080 If the product uses SSH, then it shall be capable of processing packets with uncompressed payload lengths up to 32,768 bytes or shall be configurable to specify that value; also, this length shall be the default value. This does not preclude the system from automatically sizing the Maximum Transmission Unit (MTU) if it is less than 32,768. IA-074090 If the product uses SSH, then the SSH packets shall have a maximum packet size of 35,000 bytes or shall be configurable to that value; also, this length shall be the default value. IA-074100 If the product uses SSH, then the product shall discard SSH packets that exceed the maximum packet size to avoid denial of service (DoS) attacks or buffer overflow attacks. IA-074110 If the product uses SSH, then the SSH packets shall use random bytes if packet padding is required. IA-074120 If the product uses SSH, then the system shall treat all SSH-encrypted packets sent in one direction as a single data stream. For example, the initialization vectors shall be passed from the end of one packet to the beginning of the next packet. IA-074130 If the product uses SSH, then the system shall be capable of setting Diffie-Hellman-Group14-SHA1 as the preferred key exchange mechanism for SSH.	4.2.9 IA-074000	?	Core (C) Distro (C) Access (C)

Table 3-7. ASLAN Component IA Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IA-5	**4.2.9 – Confidentiality (continued)**			
4	If the product uses SSH with X.509v3 certificates and provides an SSH server function, then the SSH server shall support the capability to use an X.509v3 certificate provided by a DoD-approved PKI. IA-075010 If the product uses SSH with X.509v3 certificates and provides an SSH server function, then the SSH Server function shall support, at a minimum, the “x509v3-ssh-rsa” and "x509v3-rsa2048- sha256” key types as defined in RFC 6187. IA-075020 If the product uses SSH with X.509v3 certificates and provides an SSH server function, then the SSH Server function shall support the capability to, in a configurable manner, specify the highest preferred key type advertised during the SSH_MSG_KEXINIT message exchange. IA-075030 If the product uses SSH with X.509v3 certificates and provides an SSH server function, then the SSH server function shall support the capability to deny SSH sessions when the session fails to negotiate a configured set of preferred key types.	4.2.9 IA-075000	L	Core (C) Distro (C) Access (C)
5	If the product uses SSH with X.509v3 certificates and provides an SSH server function, then the SSH client shall support the capability to use an X.509v3 certificate provided by a DoD-approved PKI. IA-076010 If the product provides an SSH client function and the SSH client has a CAC (or equivalent) reader, then the SSH client may use the X.509v3 certificate on the user’s CAC to establish the encrypted session. IA-076020 If the product uses SSH and if the client has a CAC (or equivalent) reader and also has its own PKI certificate from a DoD-approved PKI, then the client may use either its certificate or the certificate on the user’s CAC to establish the encrypted sessions. IA-076030 If the product uses SSH with X.509v3 certificates, and provides an SSH client function, then the SSH client shall support, at a minimum, the “x509v3-ssh-rsa” and "x509v3-rsa2048-sha256” key types as defined in RFC 6187.	4.2.9 IA-076000	L	Core (C) Distro (C) Access (C)

Table 3-7. ASLAN Component IA Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IA-5	**4.2.9 – Confidentiality (continued)**			
6	The product shall be capable of using SNMPv3 for all SNMP sessions. IA-077010 The security level for SNMPv3 in the DoD VVoIP environment shall be authentication with privacy – snmpSecurityLevel=authPriv. The product shall set snmpSecurityLevel=authPriv as the default security level used during initial configuration. IA-077020 The SNMPv3 implementation shall be capable of allowing an appropriate administrator to manually configure the snmpEngineID from the operator console. A default unique snmpEngineID may be assigned to avoid unnecessary administrative overhead, but this must be changeable. IA-077030 The security model for SNMPv3 shall be the User-Based Security Model – snmpSecurityModel =3. IA-077040 If the product receives SNMPv3 response messages, then the product shall conduct a timeliness check on the SNMPv3 message. IA-077050 An SNMPv3 engine shall perform time synchronization using authenticated messages. IA-077060 The message processing model shall be SNMPv3 – snmpMessageProcessingModel=3. IA-077070 For backwards compatibility, the product shall support the capability to use Data Encryption Standard- Cipher Block Chaining (DES-CBC) (usmDESPrivProtocol) with a 16 octet (128 bit) input key, as specified in RFC 3414, as an encryption cipher for SNMPv3. IA-077080 The product shall support the capability to use the CFB-AES128 encryption cipher usmAesCfb128PrivProtocol for SNMPv3 as defined in RFC 3826 and specify this as the default encryption cipher for SNMPv3. IA-077090 [Conditional] If the product receives SNMPv3 response messages, then the SNMPv3 engine shall discard SNMP response messages that do not correspond to any current outstanding Request messages. IA-077100 [Conditional] If the product receives SNMPv3 responses, then the SNMPv3 Command Generator Application shall discard any Response Class Protocol Data Unit (PDU) for which there is no outstanding Confirmed Class PDU. IA-077110 When using msgID for correlating Response messages to outstanding Request messages, the SNMPv3 engine shall use different msgIDs in all such Request messages that it sends out during a 150 second Time Window. IA-077120 An SNMPv3 Command Generator or Notification Originator Application shall use different request-ids in all Request PDUs that it sends out during a Time Window. IA-077130 When sending state altering messages to a managed authoritative SNMPv3 engine, a Command Generator Application should delay sending successive messages to that managed SNMPv3 engine until a positive acknowledgement is received from the previous message or until the message expires. IA-077140 The product using SNMPv3 shall implement the key-localization mechanism.	4.2.9 IA-077000	L	Core (R) Distro (R) Access (R)
7	If the product uses web browsers or web servers, then the product web browsers and web servers shall be capable of supporting TLS 1.0 or higher for confidentiality.	4.2.9 IA-078000	L	Core (C) Distro (C) Access (C)
8	The product shall be capable of using SSHv2 or TLS 1.0 or higher for remote configuration of appliances.	4.2.9 IA-079000	L	Core (C) Distro (C) Access (C)

Table 3-7. ASLAN Component IA Requirements (continued)

ID	Requirement	UCR Ref (UCR 2013) (See note 1)	LoC/ TP ID (See note 2)	R/O/C
IA-6	**4.2.10 Non-Repudiation**			
1	The security log shall be capable of using a circular (or equivalent) recording mechanism (i.e., oldest record overwritten by newest).	4.2.9 IA-084000	L	Core (R) Distro (R) Access (R)
2	Only the System Security Administrator and System Administrator roles shall have the ability to retrieve, print, copy, and upload the security log(s)	4.2.9 IA-085000	L	Core (R) Distro (R) Access (R)
3	The product/system shall be able to generate a human understandable presentation of any audit data stored in the audit trail.	4.2.9 IA-086000	L	Core (R) Distro (R) Access (R)
4	The product shall provide a mechanism to locally store audit log/event data when communication with the management station is unavailable.	4.2.9 IA-087000	L	Core (R) Distro (R) Access (R)

NOTE(S):

1. Reference UCR 2013 signed March 1, 2013.
2. Refers to test methodology for requirement verification via LoC "L", test "T", or both "L/T". Also includes test procedure number.

LEGEND:

AAA	Authorization and Accounting
AES	Advanced Encryption Standard
ANSI	American National Standards Institute
AS	Assured Services
ASLAN	Assured Service Local Area Network
BW	Bandwidth
CDP	Certificate Revocation List Distribution Point
CRL	Certificate Revocation List
DoD	Department of Defense
DS	Differentiated Services
DSCP	Differentiated Services Code Point
EAP	Extensible Authentication Protocol
F	Flash
FO	Flash Override
GMT	Greenwich Mean Time
HTTP	Hypertext Transfer Protocol
IA	Information Assurance
IAW	In Accordance With
IEEE	Institute of Electronics and Electrical Engineers
INCITS	International Committee for Information Technology Standards
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
LAN	Local Area Network
LDAPv3	Lightweight Directory Access Protocol version 3
L-LSP	Label Only Inferred Label Switched Path
LS	Local Area Network Switch
LSP	Label Switched Path
MAC	Media Access Control
MAN	Metropolitan Area Network
Mbps	Megabits Per Second
MPLS	Multiprotocol Label Switching
Ms	Milliseconds
MTU	Maximum Transmission Unit
NIST	National Institute of Standards and Technology
NM	Network Management
NTP	Network Transfer Protocol
NTPv3	Network Transfer Protocol version 3
OCSP	Online Certificate Status Protocol
PDU	Protocol Data Unit
PEAP	Protected Extensible Authentication Protocol
PKE	Public Key Enable
PKI	Public Key Infrastructure
PPP	Point-to-Point Protocol
QoS	Quality of Service
R	Router
RADIUS	Remote Authentication Dial in User Service
RFC	Request for Comments
RSA	Rivest Shamir Adleman
RTS	Real-Time Services
SNMPv3	Simple Network Management Protocol version 3
SP	Special Publication
SSH	Secure Shell
STIGs	Security Technical Implementation Guideline
TACACS	Terminal Access Control Access Control System
TCP	Transmission Control Protocol
TIA	Telecommunications Industry Association
TLS	Transport Layer Security
TOS	Type of Service
UC	Unified Capabilities
UCR	Unified Capabilities Requirement
UDP	User Datagram Protocol
VLAN	Virtual Local Area Network
VPLS	Virtual Private Local Area Network Service
VPN	Virtual Private Network
VVoIP	Voice and Video over Internet Protocol
WABs	Wireless Access Bridges
WAN	Wide Area Network
WLAS	Wireless Local Area Network Access System